The Citrus Industry

lepresentative Every Interest

Representing No Special Interest

TEXAS TECHNOLOGICAL
FEB 17 1961
COLLEGE LIBRARY

In This Issue:

Citrus Insect Control For Spring, 1961

Yellow-Vein In Citrus

Mechanical Transmission The Infectious Variegation Virus of Citrus

Citrus Grove Records

Cost of Picking and Hauling Florida Fruits, 1958-59 Season

Citrus Certified For Processing

Garry Moore To Entertain At Florida Citrus Exposition

Business Notes Lake Garfield Nurseries Moves Into New Home

igle Copy ..... 15 Cents

Subscription
$1.00 Per Year In Continental U. S.
$2.50 Per Year Outside

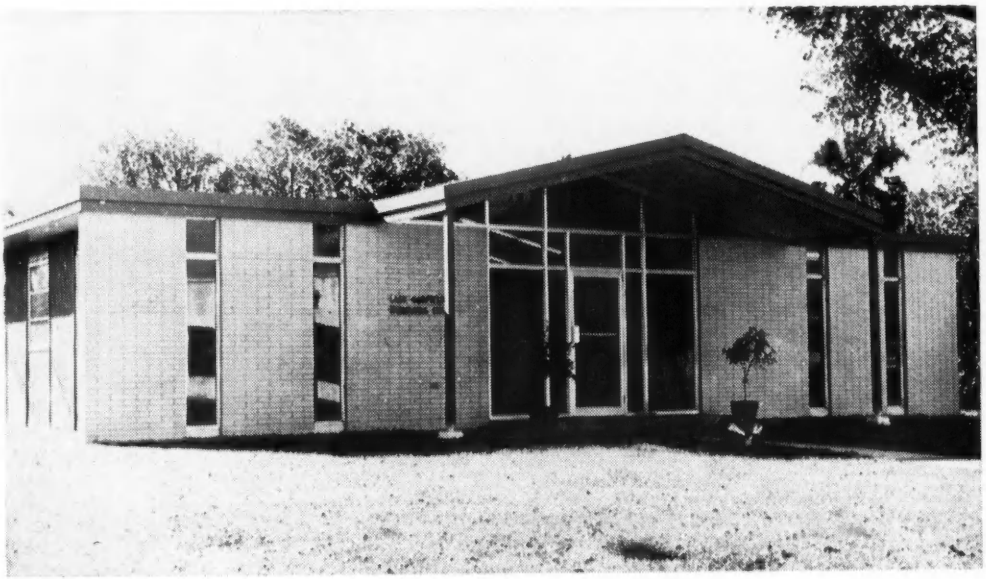
FLORIDA'S FAIR SEASON GETS UNDER WAY FOR 1961

The annual Florida State Fair gets under way Feb. 7th and continues through Feb. 18th . . . is presently one of the most spectacular programs to be seen in the United States, featuring the great Gasparilla festivities and presenting one of the most attractive and varied displays to be seen anywhere.

Then starting on March 11th at Winter Haven will be the Florida Citrus Exposition, at which this year Garry Moore and his cast will present their nationally renowned shows, in addition to having a wide variety of attractive citrus exhibits . . . then there will be selected in competition, a new citrus queen, while the famous Press Breakfast will again be one of the many features of this show.

Other fairs at Orlando, Plant City, Bowling Green, Sarasota, Dade City, St. Petersburg and many others will provide Floridians and visitors with a full quota of sight seeing and entertainment through this season of the year.

VOL. 42 — NO. 2 **FEBRUARY, 1961** **BARTOW, FLORIDA**



NOW IN OUR NEW HOME

Lake Garfield Nurseries Company, well known throughout the Florida citrus industry for the highest quality citrus nursery stock since 1915, is happy to announce the relocation of their business offices to their new home at 585 East Summerlin Street in Bartow. We invite all our friends and customers to stop in to see us whenever they are in the Bartow area. We appreciate the continued patronage of thousands of Florida citrus growers through the years, whose loyalty has enabled us to progress with them in the growth of this great industry. Whenever you need citrus nursery stock, for new plantings or for re-sets, call us for an appointment with our representative. No obligation.

BUDWOOD SELECTION AND QUALITY
OUR MOTTO SINCE 1915

LAKE GARFIELD NURSERIES CO.

P. O. Box 154-T **Bartow, Florida**

Telephones: Day, 533-4111 **Night, 533-0155**

Citrus Insect Control For Spring 1961

R. B. Johnson

R. B. Johnson
W. A. Simanton
W. L. Thompson

W. A. Simanton

Florida Citrus
Experiment Station
Lake Alfred,
Florida

W. L. Thompson

Appearance of new growth in citrus groves invariably is a warning of increased activity by nearly all citrus pests. With the exception of rust mite and chaff scale, most species were near or below average abundance during the winter which means that heavy infestations are not likely to be numerous in early spring.

Aphids will be the first to appear and will be unusually prevalent if growth starts early and ensuing cool weather prevents growth from rapidly expanding and hardening. Six-spotted mites will increase in February and be troublesome in March and April. Rust mite, although generally trending downward, will continue to be a problem in numerous groves throughout the Spring. Citrus red (purple) mite and Texas citrus mite may be expected to take a substantial upward trend in March that will continue through June. Red scale will begin to build up markedly in April. Fortunately, purple scale is not expected to be a problem except in a few groves where excessive sulfur sprays have reduced natural control.

The outlook at present is for a high degree of infection of new growth by melanose and scab organisms. This implies that growers should be prepared early in the spring to make timely application of fungicide.

Spray Program

The post-bloom spray is one of the three main sprays recommended for all Florida citrus. It is essential for the control of melanose, scab, greasy spot and rust mite, but materials for nutritional purposes and control of scale insects, spider mites and other pests should be included where needed.

The timing of the post-bloom spray is as important as the selection of its ingredients and should be based as much as possible on the disease, insects and mites that must be controlled. If a copper compound is required for scab and melanose, the post-bloom spray should be applied when two-thirds of the petals have dropped, but application should be delayed until one to three weeks after bloom for melanose alone. Materials for other purposes should be included in either case. If, on the other hand, copper is not employed, the post-bloom spray should be applied when rust mites first appear or earlier if other problems occur first.

Melanose, Scab and Greasy Spot

Rough lemon and sour orange nursery stock, Temple orange, lemons, Murcott and some Tangelos are highly susceptable to scab and should all receive a full program of scab protection. Grapefruit and tangerines are less susceptable, but scab is often a problem on grapefruit in coastal areas where this disease is most prevalent. Two sprays are recommended and usually needed for scab control. The first should be applied just before the start of the spring flush of growth to cover the old scab lesions. The second is needed to protect the fruit and new foliage and should be applied when two-thirds of the petals have dropped. Neutral copper compounds are preferred for scab control at the dosage of 0.75 pound of metallic copper per 100 gallon of spray. Although ferbam at 1.5 pound is an effective substitute for copper, it must not be used on fruit and is of no value against melanose or greasy spot. Ferbam is excellent, however, for scab on nursery stock and will give some control of rust mite.

The best control of melanose on fruit is obtained when copper is applied from one to three weeks after the petals have dropped. However, where large acreages are involved, where rust mite is also a problem or where scab must be controlled, it is best to start applying copper as soon as two-thirds of the petals have dropped. Applications of copper made during and after bloom are effective against melanose on fruit, but are too late to protect the spring flush. An extra application of copper is therefore required just after the start of the spring flush of growth if foliage protection is required. Such an application will be needed where there are large amounts of dead wood as in some hurricane-damaged groves.

Post-bloom copper applications are of value against greasy spot and should be used where this disease has been a problem.

Citrus Rust Mite

Three rust mite miticides are recommended for use on bearing citrus. These materials are Chlorobenzilate, zineb and sulfur. In addition, there are three combination miticides that are more or less effective against both rust mite and spider mites and are of some value in the post-bloom

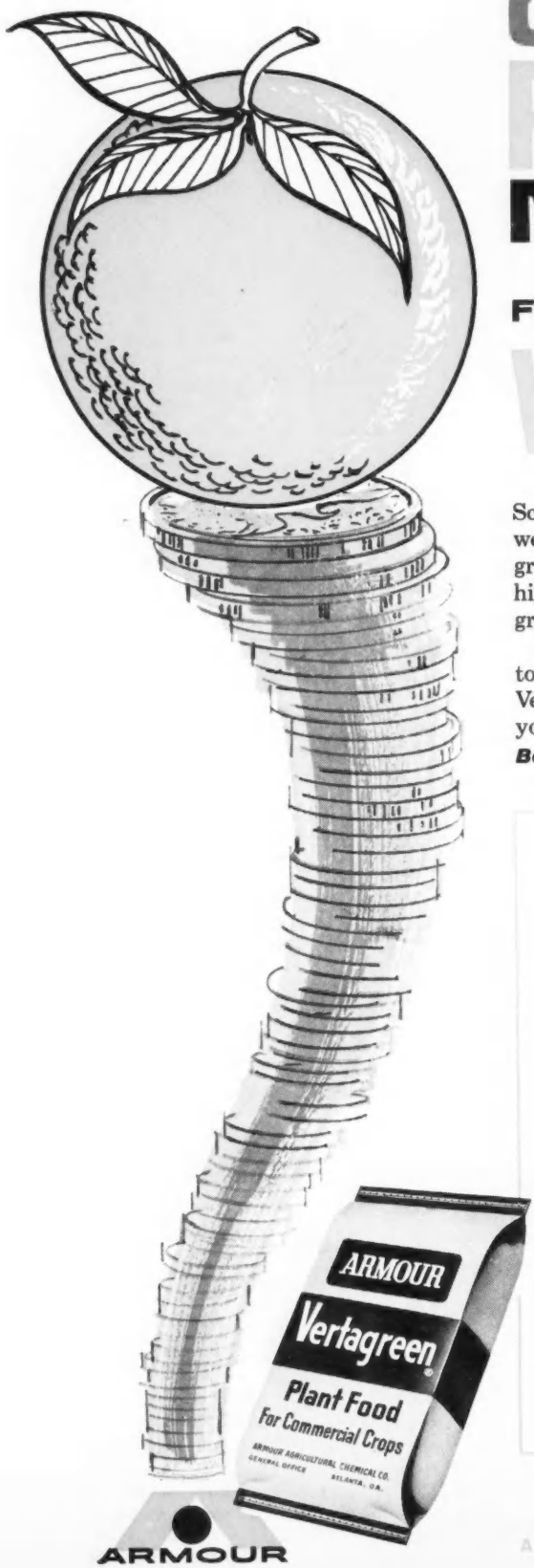
(Continued on page 18)

SCALE AND MITE ABUNDANCE BY DISTRICTS AT MID-JANUARY 1961[1]

District	Rust Mite	Citrus Red Mite	Texas Citrus Mite	Red Scale	Purple Scale
West Coast	1.75*	1.09*	.50	.83	.92
Indian River	.94	.33	.56	.95	.79
Upper East Coast	.88	.88	.63	.75	.25
Gainesville	.17	.17	0	0	.33
Orlando	.59	.96	.18	.70	.78
Brooksville	1.65*	.65	.41	.65	.94
Ridge	2.11*	.26	.21	.91	.91
Bartow	2.25*	1.50*	1.00	1.09*	.64
State Average	1.32	.69	.39	.79	.77
Last Year	1.29	.77	.30	.75	.80

Abundance is computed from the number and intensity of infestations in groves not recently sprayed. Figures marked * indicate threatening conditions.

[1]Written January 19, 1961. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. B. Anderson, Jr., Lake Alfred.



CITRUS PROFITS MOUNT

When You Use FLORIDA-FORMULATED ARMOUR Vertagreen®

Scientifically formulated for Florida soil and weather, Armour Vertagreen has an extra growth boost that gives you bigger yields of higher-quality citrus fruit . . . more profit per grove.

See your friendly Armour representative today, and order Florida-Formulated Armour Vertagreen. Let your extra profits prove to you that ***Armour Vertagreen Is Worth More Because It Does More!***

These Armour field representatives stand ready to give the finest quality and service

Owens, S. O.
P. O. Box 3007 (6)
Jacksonville 11, Florida
Phone: RA-5-5491

Eaddy, L. L.
P. O. Box 285
Lake City, Florida
Phone: 3206

Fuqua, H. L.
P. O. Box 413
Tallahassee, Florida
Phone: 224-7935

Smith, J. B.
P. O. Box 306
Newberry, Florida
Phone: GR-2-2356

Williams, W. S.
P. O. Box 542
DeLand, Florida
Phone: RE-4-1316

Scott, J. E.
P. O. Box 1957
Vero Beach, Florida
Phone: JO-7-2263

Cochran, J. F.
P. O. Box 1121
Pompano Beach, Florida
Phone: WE-3-1660

Butler, G. C., Jr.
P. O. Box 3
Perrine, Florida
Phone: CE-5-4067

Brantley, J. T.
P. O. Box 352
Homestead, Florida
Phone: CI-7-6658

Anderson, M. D.
P. O. Box 985
Sebring, Florida
Phone: EV-5-0766

Barber, R. V.
P. O. Box 6
Palmetto, Florida
Phone: 6-2503

Beckett, W. W.
P. O. Box 7701
Orlando, Florida
Phone: GA-3-9890

Gotsch, O. H.
P. O. Box 301
Lake Hamilton, Florida
Phone: HA-2-4707

Kemper, D. R.
P. O. Box 158
Clermont, Florida
Phone: EX-4-2063

McCormick, D. C.
P. O. Box 1549
Fort Myers, Florida
Phone: MO-3-7206

Pinner, R. E.
P. O. Box 561
Bartow, Florida
Phone: 533-9717

Zellner, M. F.
P. O. Box 7
Floral City, Florida
Phone: PA-6-2085

There's An Armour Fertilizer For Every Growing Need

ARMOUR AGRICULTURAL CHEMICAL COMPANY
Davenport and Jacksonville, Florida

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

YELLOW-VEIN IN CITRUS

C. D. LEONARD AND
IVAN STEWART
FLORIDA CITRUS EXPERIMENT STATION, LAKE ALFRED

Yellow-vein in citrus (often called winter chlorosis in Florida) is characterized by a yellowing of the veins of the leaves (Fig. 1). In mild cases only the midrib becomes yellow. In more severe cases, the midrib and many of the lateral veins are yellow, or the entire leaf may become yellow.

Yellow-vein usually occurs in Florida citrus only during the winter months, after a period of cold weather. It is seen most frequently on young trees up to 4 or 5 years of age, but is found at times on older trees. Red and pink grapefruit appear to be the most susceptible, but it occurs on most commercial citrus varieties. The number of branches and leaves showing this symptom varies greatly from tree to tree. Many of the severely affected leaves will drop prematurely if corrective treatment is not applied promptly.

This leaf pattern may also be associated with a number of citrus disorders, as when the bark or root system is injured by machinery, excess water, or disease (9), in which case it may appear during any part of the year.

The work reported here was an effort to determine the cause of yellow-vein and to find a method of correcting it.

Review of Literature

Cooper, Olson and Shull (3) reported that yellow-vein is sometimes found on young uninjured citrus trees during cool weather, especially in Arizona and California. In 1957 they found considerable yellow-vein in three Texas red grapefruit groves. They reported a close similarity between high-water-table-induced and cold-weather-induced yellow-vein. In both types, yellow-vein was generally more severe on trees on virus-affected rootstocks (including exocortis and xyloporosis) than on those on healthy rootstocks. Their study of a large number of different root-stocks indicated that the rootstock itself did not determine the susceptibiliy of the tree to yellow-vein. They concluded that the cause of the yellow-vein was the weak root system resulting from the virus infection of intolerant rootstocks, rather than the virus itself.

Kletz and Fawcett (5) stated that general starvation is indicated by vein chlorosis followed by a general chlorosis, and that this pattern accompanies and follows the destruction of roots, as by girdling and drowning. Merwe and Anderssen (6) described yellow-vein in the eastern Transvaal of Africa, but called it "yellow branch," and tentatively ascribed the symptom to chromium toxicity. Smith and Reuther (11) in Florida, and Haas (4), and Chapman and Vanselow (2) in California associated yellow-vein with boron deficiency in citrus. The latter noted, however, that nitrogen and phosphorus deficiency, old age, root rotting and damage to the vascular system often cause vein yellowing in citrus. Roy (10), who produced boron deficiency of citrus in sand culture in Florida, and Morris (7) of Southern Rhodesia, who first observed boron deficiency of citrus in the field, did not list yellow-vein among the boron-deficiency symptoms which they found. This leaf pattern is not, therefore, specific for boron deficiency in citrus.

Chapman, Brown and Rayner (1) of California stated that a vein-chlorosis condition is commonly observed on nitrogen-deficient trees, particularly on lemons, and is more prominent on older leaves. They also stated that the vein chlorosis is a type of premature senescence in which a part of the nitrogen of the leaf is translocated back into the tree because of inadequate nutrition.

Experimental

Chemical Analyses of Yellow-vein Leaves.—During the winters of 1953 and 1954, samples of yellow-vein leaves from many affected groves, green leaves from affected trees and green leaves from nearby trees showing no yellow-vein were analyzed for various nutrient elements. This was done in an effort to find a clue as to the cause of the disorder. All samples were analyzed for total nitrogen, calcium, and potassium, and most were analyzed for boron, phosphorus and magnesium. The yellow-vein leaves were found to be consistently lower in nitrogen, and in nearly every case were also lower in calcium than the

---

Florida Agricultural Experiment Stations Journal Series No. 1154.
Presented Fla. State Hort. Soc., October, 1960

green leaves (Table 1). Yellow-vein leaves did not vary consistently from green leaves in phosphorus, magnesium and boron content. The only consistent difference in the potassium

DR. C. D. LEONARD

content of yellow-vein leaves and green leaves was the usual inverse relationship between potassium and calcium.

Trees affected with yellow-vein usually are not completely chlorotic, but may have branches of green leaves. Such green leaves on affected trees were found to contain about the same amounts of nitrogen and calcium as green leaves from nearby healthy trees. Very little difference was found between the nitrogen and calcium conents of leaves showing mild, moderate, and severe yellow-vein in the same grove.

Field Experiments

Experiment in Valencia Orange Grove.—Since leaf analysis had shown that yellow-vein leaves were always lower in nitrogen than green leaves, a field experiment was set up in a yellow-veined young Valencia orange grove, to determine whether nitrogen fertilization would correct the disorder. In December, 1954, affected trees were given 5 pounds sodium nitrate or equivalent nitrogen as ammonium sulfate, and others were left untreated. By March 25, 1955, all yellow-vein leaves had greened up on the treated trees, but not on the untreated checks. At that ime leaf samples were aken separately from previously tagged yellow-vein twigs and green twigs. Both nitrogen sources greatly increased the nitrogen content of leaves that were yellow-veined when treated, as compared with the untreated checks (Table 2). Leaves from trees given ammonium sulfate contained slightly more nitrogen than those from trees given sodium nitrate. Some increase in calcium content of the yellow-vein leaves was evident, even though the nitrogen sources used contained no calcium.

Experiment in Pink Grapefruit Grove.—Since the above experiment with Valencia orange trees showed that nitrogen would correct yellow-vein, a more extensive test was started near Clermont in January, 1956, in a 20-acre block of relatively large three-year-old pink grapefruit trees that showed severe yellow-vein on many trees. The grove had been fertilized in December, 1955, but no rain had fallen since that time.

Three nitrogen sources were applied in equivalent amounts to some of the most severely affected trees early in January. Each material was applied at four different rates and replicated three times as follows:

$NaNO_3$ Equivalent Pounds per Tree	Nitrogen Sources			When Applied
4	$(NH_4)_2SO_4$,	$NaNO_3$,	$Ca(NO_3)_2$	Jan. 6, 1956
4 (twice)	"	"	"	Jan. 6 and Feb. 15, 1956
2 (twice)	"	"	"	Jan. 6 and Feb. 15, 1956
7	"	"	"	Jan. 23, 1956

treated. All three sources of nitroge gave substantial greening of the ye low-vein leaves, but the greening w fastest and most complete with a monium sulfate. The trees given a

DR. IVAN STEWART

monium sulfate had a noticeably da er green color and consistently high leaf nitrogen than those given eit

Fig. 1. Orange leaves with yellow-vein caused by nitrogen deficiency. Green leaf at left.

The usual spring fertilization in this block was omitted.

Leaf samples were taken on March 9, March 22, April 20, and June 4, 1956, from branches previously tagged as showing severe yellow-vein when

of the two nitrate fertilizers. The ference in leaf nitrogen was great for the first sampling on March 9, dicating the more rapid uptake utilization of ammonium nitro than nitrate nitrogen by the trees the March 22 sampling, this dif ence in leaf nitrogen was found each of the four levels of nitro applied (Table 3). The calcium tent of the leaves from trees g calcium nitrate averaged only slig

higher than that of leaves from trees given either sodium nitrate or ammonium sulfate. It should be noted, however, that both sodium nitrate and ammonium sulfate raised the calcium content of the yellow-veined leaves even though these materials contained no calcium.

The 2-pound treatment of sodium nitrate and calcium nitrate applied twice was not sufficient to completely green up all the yellow-vein leaves on the trees, and the leaf nitrogen remained in the deficient range of less than 2 percent. The same total amount of nitrogen applied at one time gave better greening and higher leaf nitrogen.

All trees given the 4-pound treatments applied both once and twice were sampled again on June 4, 1956, taking the current spring flush leaves. No yellow-vein appeared on any of the new spring flush. Separate samples were taken from branches that showed yellow-vein at the time of treatment and from branches of the same trees that were green when treated. Leaves from both yellow-vein and green branches of the ammonium sulfate-treated trees showed consistently higher total leaf nitrogen than those from trees given either sodium nitrate or calcium nitrate (Table 4). Calcium nitrate supplied considerably more calcium to the leaves than the other two sources. This difference in leaf calcium content was much greater in the spring flush than it had been in earlier samplings of 1955 flushes. The untreated checks, while containing enough nitrogen to produce green, healthy spring flush leaves, were lower in nitrogen than any of the treated trees.

Because yellow-vein leaves were low in calcium as well as nitrogen, when compared with green leaves, two calcium sources that supplied no nitrogen—soluble calcium chloride and less soluble calcium sulfate (gypsum)—were applied to yellow-vein trees to test the effect of calcium alone on yellow-vein. These materials increased the calcium content of the leaves but did not increase the nitrogen content (Table 5). Both sources failed to correct the symptoms of yellow-vein.

Table 1. Average nitrogen, calcium, potassium, and boron contents of yellow-veined leaves and green leaves of citrus.

Grove No.	N. Percent		Ca. Percent		K. Percent		B. ppm	
	Y-V	Green	Y-V	Green	Y-V	Green	Y-V	Green
Oranges, Acid Soil								
1	1.50	2.33	1.62	2.50	2.12	1.62	43	48
2	1.62	2.38	1.56	2.81	1.67	1.43	38	61
3	1.51	2.22	2.50	2.93	1.81	1.53	30	21
4	1.98	2.59	2.18	2.75	1.50	1.37	57	48
5	1.90	2.46	0.87	2.56	1.15	1.59	31	20
6	1.85	2.38	2.25	1.71	1.40	0.98	52	47
7	1.69	2.64	1.43	2.62	1.62	1.76	--	--
8	1.76	2.93	1.25	2.34	1.80	1.93	33	44
9	1.93	2.74	1.25	2.37	1.84	1.78	--	--
Avg.	1.75	2.52	1.66	2.51	1.66	1.55	41	41
Grapefruit, Acid Soil								
10	1.54	1.90	1.27	2.68	2.46	2.06	70	76
11	1.55	1.93	2.44	3.00	1.75	1.67	40	42
12	1.74	2.78	1.18	3.06	1.65	1.50	35	52
Avg.	1.61	2.20	1.63	2.91	1.95	1.74	48	57
Grapefruit, Calcareous Soil								
13	1.59	1.97	2.37	3.07	1.09	0.95	44	52
14	1.69	2.71	2.08	5.31	1.71	1.13	--	--
Avg.	1.64	2.34	2.22	4.19	1.40	1.04	44	52
General Yellowing (N Deficiency, Grapefruit on Acid Soil)								
15	1.22	1.95	1.71	2.21	2.30	2.05	76	77
16	1.50	1.99	2.37	2.50	1.97	1.87	49	53
Avg.	1.36	1.97	2.04	2.35	2.13	1.96	62	65

Sand Culture Studies

One of the problems in studying yellow-vein in citrus groves is its unpredictability from year to year, and the resulting difficulty of finding groves with many affected trees. Furthermore, if the soil contains a considerable amount of available nitrogen, as from a fairly recent fertilization still lying dormant because of lack of moisture, all affected trees will show partial greening of the yellow-vein leaves after moisture becomes available. This makes it difficult in some cases to accurately assess the value of applied treatments in the grove. For these reasons a sand culture experiment was deemed necessary to further check field results that indicated nitrogen deficiency to be the cause of yellow-vein.

Nitrogen and Calcium Deficiency Study.—This experiment wwas set up to create deficiencies of nitrogen, of calcium, and of both nitrogen and calcium prior to cold weather, to see whether yellow-vein would appear.

In July 1955, two-year-old Ruby Red grapefruit and Parson Brown orange trees budded on Rough lemon rootstock were set in 5-gallon glazed earthenware pots containing well-washed builder's sand. Three trees of each variety were given a complete nutrient solution, which included the following elements expressed in parts per million: 126 N, 168 K, 71 P, 73 Mg, 180 Ca, 0.25 B, 0.25 Zn, 0.02 Cu, 0.01 Mo, and 5 Fe. These were supplied as ammonium nitrate, potassium sulfate, mono-potassium phosphate, magnesium sulfate, calcium chloride, boric acid, manganese sulfate, zinc sulfate, copper sulfate, molybdic acid, and iron ethylenediamine tetraacetate. Each tree received one liter of the nutrient solution each week, and additional water as needed. The remaining trees received the same solution, except that nitrogen, or calcium, or both nitrogen and calcium were withheld.

In December 1955, after some cold weather, considerable yellow-vein appeared on the leaves of the grapefruit trees on both the minus-nitrogen and the minus-nitrogen-minus-calcium treatments. Yellow-vein did not appear on the trees given all nutrients except calcium.

The minus-nitrogen and the minus-nitrogen-minus-calcium treatments also produced yellow-vein on the orange trees, but it was less severe than on

(Continued on page 12)

Table 2. Effect of two nitrogen fertilizers on the nitrogen and calcium content of leaves from young Valencia orange trees affected with yellow-vein1.

Leaf Condition When Treated	Leaf Condition When Sampled	Treatment	N %	Ca %
Yellow-vein	Yellow-vein	None	1.75	1.78
Green	Green	None	2.57	2.40
Yellow-vein	Green	5 lbs. $NaNO_3$	2.64	2.10
Green	Green		3.03	2.43
Yellow-vein	Green	4 lbs. $(NH_4)_2SO_4$	2.84	2.23
Green	Green		3.08	2.45

1Treated December 30, 1954. Sampled March 25, 1955.

ethion

ETHION KILLS MITES ON BOTH ORANGES AND GRAPEFRUIT. This powerful new miticide has been approved by the U. S. Department of Agriculture for control of all major mite pests on both oranges and grapefruit. With Ethion, you get quick kill and long-lasting control of citrus red mite, rust mite, Texas citrus mite, and other mite species. In addition to outstanding effectiveness, Ethion gives you: **Economy.** Ethion costs less to use and its extended residual activity spreads your spray dollar. And because you apply it on oranges *and* grapefruit, Ethion saves by simplifying your program. **Mildness.** Ethion has no adverse effect on developing fruit or foliage. It allows fruit to develop fully and naturally for bumper crops free of spray damage. **Safety in Feeds.** When Ethion is applied according to label directions, pulp may be used for animal feeds.

TECHNICAL CHEMICALS DEPARTMENT, NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORPORATION, MIDDLEPORT, NEW YORK

Mechanical Transmission of The Infectious Variegation Virus of Citrus

. . . By . . .
T. J. GRANT AND M. K. CORBETT

Infectious variegation was described as a poshible virus disease of citrus in 1931 by Petri[1]. His description of symptoms and his illustrations are similar to those reported by Fawcett and Klotz[2], who transmitted the causal agent by budgrafting from variegated lemon to sour orange. They noticed that some of the symptoms were similar to those associated with psorosis and suggested that the diseases might possibly be related. Klotz and Fawcett[3] noted that crinkly leaf of lemon is sometimes associated with infectious variegation. Fawcett and Bitancourt[4] were uncertain whether infectious variegation differed sufficiently from crinkly leaf to be considered a separate disease. From cross-protection studies, Wallace[5] concluded that infectious variegation is caused by a strain of the psorosis virus. Grant and Smith[6] reported infectious variegation in Florida and transmitted the causal agent by bud and leafpiece grafts to several different species of citrus.

Many unsuccessful attempts have been made to transmit mechanically the viruses responsible for tristeza, psorosis, xyloporosis, and exocortis. To date these failures have been explained on the basis of insufficient virus concentration in the inocula, inhibitors, intrinsic properties of the virus, or the susceptibility of the test plant. In 1959, Holmes[7] reported the mechanical transmission of potato mottle virus to three species of citrus. The virus induced only one local lesion on one plant of each species, and was recovered to plants of Nicotiana tabacum. The virus was not recovered from non-inoculated leaves of citrus. Holmes[7] concluded that failures to transmit citrus viruses mechanically may have been due to the use in insuceptible or insufficiently susceptible test plants rather than to the presence of inhibitors in citrus foliage.

In the present investigations, leaves of Eureka lemon plants with typical symptoms of infectious variegation—such as vein banding, veinlet banding, speckle, blotch, and crinkle—were frozen (-10° to -20° C.) in a mortar with 1 ml. of 20 per cent sucrose per gm. of leaf material and with a small amount of activated charcoal. The material was thawed and triturated with a mortar and pestle. The pulp was squeezed through the cheese-cloth, and expressed juice obtained in this way was used for subsequent inoculations. Leaves to be inoculated were dusted with 500-mesh 'Carborundum' and inoculated by rubbing with a gauze pad saturated with inoculum or by brushing with a nylon-bristle brush that had been dipped in the inoculum. Inoculated leaves were rinsed with tap water immediately after inoculation. The tests were conducted during January-March. The test plants were either very young seedlings (2- to 4-leaf stage) or older seedlings approximately 12-14 in. high. Controls were comparable test plants that were treated as described except that leaves from healthy Eureka lemon plants provided the source of 'inoculum'.

Fig. 1. Leaf of Eureka lemon 14 days after mechanical inoculation with infectious variegation virus, showing expansion of initial local lesions and starch-retention pattern. Leaf was cleared in alcohol and staned with iodine.

In three experiments in which the test plants were young when mechanically inoculated, all inoculated plants became infected (Table 1). Some transmission to older plants was obtained, but the results were erratic. Fifteen to twenty-five days after inoculation, some Eureka lemon plants exhibited systemic symptoms identical with those on the source plant. The sour-orange seedlings exhibited vein banding and, later, chlorotic blotches in young leaves, and leaf crinkle and cupping. Some inoculated leaves of Eureka lemon 8-10 days after inoculation exhibited slight chlorotic blotches that afterwards enlarged. When such leaves were cleared in alcohol and stained with iodine, they showed typical starch lesions[3] (Fig. 1).

Both inoculated and non-inoculated leaves of the test plants were examined for veins in two ways. Mechanical inoculations were attempted by the methods described, and leaf pieces were grafted to lemon and sour-orange seedlings. Virus was recovered from young systemically infected leaves as well as from inoculated leaves of experimentally infected plants by leaf piece-graft inoculations. Virus was transmitted by mechanical means from young systemically infected leaves but not from inoculated leaves. The failure to recover the virus by mechanical means from the inoculated leaves may be due to the age of leaf or to low concentration of virus. Old leaves are difficult to triturate with a mortar and pestle, and the virus concentration may be low because of the type of local virus multiplication.

It seems unlikely that use of insufficiently susceptible test plants could account for the previous failures of mechanical transmission of citrus viruses. The results reported here show that the failure of mechancial transmission of at least one citrus virus is not due to low concentration or intrinsic nature of the virus. Earlier attempts may have failed because inhibitors were not removed.

The effect of sucrose and activated charcoal on the successful transmission of infectious variegation from citrus to citrus is unknown. Possibly enzyme-inhibiting

(Continued on Page 11)

* Florida Agricultural Experiment Station, Journal Series, No. 1125.
Cooperative work of U.S.D.A. and University of Florida.

TECHNICAL CHEMICALS DEPARTMENT, NIAGARA CHEMICAL DIVISION, FOOD MACHINERY AND CHEMICAL CORPORATION, MIDDLEPORT, NEW YORK

THE PERFECT NUTRITIONAL—FUNGICIDE SPRAY
----TENNESSEE'S BIG THREE----

PHOTO COURTESY FLORIDA CITRUS COMMISSION

PROVEN SUPERIOR BY SUCCESSFUL CITRUS GROWERS

1. **TRI-BASIC COPPER** (Micronized)—The dependable fungicide for complete protection against fungus disease —
2. **TENNESSEE'S NU-Z**—The neutral zinc that gives perfect correction and prevention of Zinc deficiency —
3. **SPRAY NU-MANESE**—Gives positive control and prevention of Manganese deficiency —

... ALL THREE NEUTRAL MATERIALS—
RESIDUE ON LEAVES HELD TO A MINIMUM ---

—Whether You Buy Nutritional Mixtures—or Straight Materials—for Your Spray Program—Always Specify THESE TENNESSEE PRODUCTS—Your Assurance of Quality and Dependability—

TC TENNESSEE CORPORATION

TENNESSEE CORPORATION
612-629 GRANT BUILDING, ATLANTA 3, GEORGIA

Citrus Certified For Processing

By ZACH SAVAGE
AGRICULTURAL ECONOMIST
AGRICULTURAL EXPERIMENT STATION

The record of Florida fruit certified for processing began with the 1949-50 season when the total was 49.7 million boxes. This was the smallest amount so certified in the 11 seasons of 1949-60. Such fruit increased each season, with two exceptions, and was 89.1 million boxes in 1958-59. See Table 1. Over the years, most of the increase in production has gone into processed fruit. The proportion of the production certified for processed fruit has increased, also. This increase was from 52 per cent in 1951-52 to 70.5 percent in 1958-59. Processed fruit made up 68 percent of the 1959-60 production.

Oranges

The volume of oranges certified for processing more than doubled from 34.7 million in 1949-50 to 70.1 million in 1959-60. The volume for processing in 1949-50 was 169 percent of the fresh that season and the volume for processing in 1959-60 was 451 percent of the fresh. The proportion certified for processing increased from 59 percent in 1949-50 to 80 percent in 1948-59 and was 77 percent in 1959-60.

Grapefruit

The volume of grapefruit certified for processing increased from 13.5 million boxes in 1949-50 to 20.0 million in 1953-54. Such volume was 14.3 million in 1959-60. In eight of these 11 seasons the volume for processing exceeded the volume for fresh shipments. The proportion certified for processing decreased from 56 per cent of the crop in 1949-50 to 45 percent in 1954-55 and stood at 47 percent in 1959-60.

Tangerines

The volume of tangerines certified for processing was highest at 1.6 million in 1949-50 and 1958-59 and lowest at 0.4 million in 1957-58. The proportion certified for processing was highest at 35 000 boxes were certified in 1955-56, 189,000 in 1956-57, 55,000 in 1957-58, 73,000 in 1958-59 and 79,000 in 1959-60. This was 29, 47, 16, 29 and 25 percent, respectively, of the production in these seasons. percent in 1958-59 and lowest at 15 percent in 1951-52. All other seasons ranged from 17 to 32 percent and was 19 percent in 1959-60.

Limes were certified in only five seasons, 1955-60, when they were certified for processing. The Florida lime crop is not large but 115,-

Table 1. Certified Florida Citrus Fruit for Use at Canning and Concentrating Plants in Florida by Seasons

Season	Grapefruit		Oranges		Tangerines		Limes		Totals	
	Boxes 1,000	Percent of Production	Boxes 1,000	Percent of Production	Boxes 1,000	Percent of Production	Boxes 1,000	Percent of Production	1,000	Percent of Production
1949-1950	13,486	55.7	34,657	59.2	1,595	31.9			49,738	56.7
1950-1951	17,814	53.7	41,858	62.2	1,354	28.2			61,026	58.0
1949-1950	13,486	55.7	34,657	59.2	1,595	31.9			49,738	56.7
1951-1952	13,593	37.8	47,451	60.4	657	14.6			61,701	51.8
1952-1953	15,167	46.7	45,839	63.5	1,064	21.7			62,070	56.6
1953-1954	20,048	47.7	62,813	68.8	1,038	20.8			83,899	60.7
1954-1955	15,660	45.0	60,570	68.5	1,105	21.7			77,335	60.3
1955-1956	18,661	48.7	64,909	71.3	981	20.9	115	28.7	84,666	63.0
1956-1957	19,029	50.9	67,823	72.9	1,259	26.2	189	47.3	88,300	65.0
1957-1958	16,491	53.0	64,253	77.9	351	16.7	55	15.7	81,150	69.9
1958-1959	18,553	52.7	68,874	79.6	1,595	35.4	73	28.9	89,095	70.5
1959-1960	14,298	46.9	70,134	76.6	540	19.3	79	24.7	85,051	68.0

Sources: Citrus and Vegetable Inspection Division, Florida Department of Agriculture, Winter Haven and Florida Crop and Livestock Reporting Service, Orlando.

Mechanical Transmission of The Infectious Variegation Virus of Citrus . . .

(Continued from page 9)

properties of sucrose are somehow related to a mechanism by which sucrose might negate the effects of viral inhibtors in juice of citrus leaves.

The beneficial effects of sucrose and activated charcoal may be elucidated after further study. The important fact at present is that a citrus virus has for the first time been transmitted mechanically from citrus to citrus. Mechanical transmission of any citrus virus immediately facilitates work on the properties of the virus, host-range, test plants, symptomatology, purification, serology, indexing methods, and eventually morphology of the virus particle associated with the disease. Further work on mechanical transmission of variegation and other citrus viruses from the point of view of inhibitors, host, and virus concentration is in progress

[1]Petri, L., Boll. R. Stazione Pat. Veg. N. S., 11, 105 (1931).
[2]Fawcett, H. S. and Klotz, L. J., Phytopath., 29, 911 (1939).
[3]Klotz, L. J., and Fawcett, H. S. (Univ. Calif. Press, 1941).
[4]Fawcett, H. S., and Bitancourt, A. A., Phytopath., 33, 837 (1943).
[5]Wallace, J. M., Hilgardia, 27, 223 (1957).
[6]Grant, T. J., and Smith, P. F., Plant Dis. Rep., 44, 426 (1960).
[7]Holmes, F. O., Phytopath., 49., 729 (1959).

Table 1. Numbers of Citrus Seedlings Infected By Infectious Variegation Virus Mechanically Transmitted From Eureka Lemon

Exp.	Test species	Relative age of test plants	Transmission Test plants*	Controls
1	Eureka lemon	Young**	7/7	0/7
2	Eureka lemon	Young	5/5	0/5
3	Sour orange	Young	5/5	0/5
4	Eureka lemon	Old***	3/3	0/3
5	Eureka lemon	Old	1/3	0/3
6	Sour orange	Old	1/3	0/3

*Numerator is number of plants infected after a five-week period and the denominator the number inoculated.
**Seedlings in 2- to 4-leaf stage.
***Seedlings 12-14 in. tall.

YELLOW-VEIN IN CITRUS

(Continued from page 7)

the grapefruit trees.

In January 1956, after yellow-vein became severe on many of the trees described above, each week two liters per tree of a solution of 167 ppm N was given to three of the most severely affected trees of each variety under the minus-nitrogen treatment, and three trees under the minus-nitrogen-minus-calcium treatment. Three other trees under the latter program were given 250 ppm calcium without nitrogen, three were given both nitrogen and calcium, and three were left as checks.

Table 3. Effect of three nitrogen fertilizers applied at three rates on the nitrogen and calcium content of leaves from pink grapefruit trees affected with yellow-vein1.

Nitrogen Source	Lbs. $NaNO_3$ Equivalent per Tree	Y-V Leaf Pattern		N %	Ca %
		When Treated	When Sampled		
$NaNO_3$	4 (twice)	Severe	Trace	2.23	3.05
	4	Severe	Trace	2.17	2.87
	2 (twice)	Severe	Moderate	1.86	2.80
	7	Severe	Trace	2.07	3.14
	Average			2.08	2.97
$Ca(NO_3)_2$	4 (twice)	Severe	Trace	2.14	3.14
	4	Severe	Trace	2.11	3.35
	2 (twice)	Severe	Moderate	1.88	2.44
	7	Severe	Trace	2.05	3.27
	Average			2.05	3.05
$(NH_4)_2SO_4$	4 (twice)	Severe	Green	2.50	2.63
	4	Severe	Green	2.43	2.87
	2 (twice)	Severe	Green	2.10	3.20
	7	Severe	Deep Green	2.29	3.17
	Average			2.33	2.97
Check	None	Severe	Moderate	1.79	2.25

1Sampled March 22, 1956 (1955 growth).

The yellow-veined trees that were given nitrogen (both with calcium and without calcium) started to green up within two weeks after nitrogen was added, and became completely green in 6 to 8 weeks. Addition of nitrogen alone to yellow-veined trees formerly on the minus-nitrogen-minus calcium treatment produced greening just as quickly as it did on trees formerly on the minus-nitrogen treatment that did receive calcium. Addition of calcium without nitrogen to yellow-veined trees formerly on the minus-nitrogen-minus-calcium treatment failed to correct the yellow-vein.

In April 1956, leaf samples were analyzed for total nitrogen, calcium and potassium. All trees that received nitrogen contained high leaf nitrogen and were green (Table 6). Supplying nitrogen without calcium to yellow-veined trees did not raise the calcium level of the leaves. This is in contrast to results obtained in the field, but it should be noted that yellow-vein leaves produced in sand culture were not lower in calcium than green leaves.

Nitrogen, Calcium and Boron Deficiency Study.—The sand culture experiment was modified and expanded during the second year to include a study of boron deficiency. During the first year the minus-calcium treatment had not produced yellow-vein, and the trees suffered only a slight reduction in growth. This treatment was continued to reduce the leaf calcium below one percent. Starting in July, 1956, nitrogen was withheld again from both grapefruit and orange trees that had developed yellow-vein the previous winter and had been greened up by adding nitrogen. Starting in October, boron was withheld from 9 grapefruit trees and 6 orange trees.

In December and January, again after a period of cold weather, yellow-vein appeared on the minus-nitrogen trees, but not on the minus-calcium or minus-boron trees. On January 23, 1957, three different nitrogen sources—ammonium nitrate, ammonium sulfate, and calcium nitrate—were added in solution to three yellow-veined trees of each variety for each source. The treatments were repeated once a week for several weeks, with a complete nutrient solution used occasionally to supplement the straight-nitrogen solutions.

Trees given ammonium nitrate greened most rapidly, produced the largest spring flush, bloomed abundantly and set considerable fruit. One tree was completely green one month after first applying the ammonium nitrate. This treatment also gave the highest leaf nitrogen (Table 7). Ammonium sulfate and calcium nitrate treatments produced less new growth and bloom than ammonium nitrate, but greened the yellow-veined leaves in 8 to 10 weeks.

The minus-calcium trees, while developing no yellow-veined leaves, showed considerable stress due to calcium deficiency. They had virtually stopped growing and many small twigs had died back. All were in very poor condition. Accordingly, in March, 1957, calcium was added as calcium chloride to three trees of each variety which, at that time, had been under the minus-calcium treatment for 20 months. Within a month one tree of each variety had died. The other two of each variety showed excellent recovery from the calcium deficiency two months after the first calcium was added. Several of the trees that were continued on a minus-calcium treatment died during the summer.

The minus-boron trees were maintained without boron until June, 1958, when the experiment was discontinued. They had shown no signs of yellow-vein during the period of 20

Table 4. Effect of three nitrogen fertilizers on the nitrogen and calcium content of spring flush leaves of pink grapefruit trees affected with yellow-vein during the previous winter1.

Nitrogen Source	Lbs. $NaNO_3$ Equivalent per Tree	N. Percent		Ca. Percent	
		Y-V	Green	Y-V	Green
$NaNO_3$	4 (twice)	2.57	2.96	2.48	3.16
	4	2.36	2.69	3.72	4.75
	Average	2.47	2.83	3.10	3.96
$(NH_4)_2SO_4$	4 (twice)	2.82	3.16	2.86	3.55
	4	2.58	2.82	3.52	3.92
	Average	2.70	2.99	3.19	3.74
$Ca(NO_3)_2$	4 (twice)	2.46	2.73	4.57	4.60
	4	2.53	2.64	4.26	4.49
	Average	2.50	2.69	4.42	4.55
Check	None	2.26	2.44	3.68	4.02

1Sampled June 4, 1956. Column "Y-V" shows analyses of leaves from branches affected with yellow-vein when treated. There was no yellow veining of any spring flush leaves. Column "green" shows analyses of leaves from branches that had only green leaves when treated, from the same trees as those shown in the "Y-V" columns.

months they were on the minus-boron treatment.

Discussion

The most common symptom of nitrogen deficiency in citrus is a gradual paling and eventual yellowing of the entire leaf, without yellow-vein. This symptom may appear at any time of the year, and ordinarily is the only sign of nitrogen deficiency during the spring, summer and fall growing season. Such yellow, nitrogen deficient leaves are often lower in nitrogen than those showing yellow-vein, but they show less difference in calcium between yellow leaves and green leaves (Table 1). This deficiency can, of course, be corrected by nitrogen fertilization.

Yellow-vein may be found at any time of the year on branches of citrus trees suffering from root injury as a result of excessive water, disease, deep cultivation near the tree, etc., or on which the bark has been injured mechanically or by disease. This type of yellow-vein is also caused by nitrogen deficiency in the affected leaves, which are low in nitrogen, but is brought on by poor translocation of nitrogen from roots to leaves. It can occur even when there is plenty of nitrogen and moisture in the soil, and usually cannot be corrected by nitrogen fertilization. The yellow-vein reported by Cooper, Olson and Shull (3) on trees on virus-affected rootstocks apparently was of this type, caused by poor translocation of nitrogen by the disease-weakened root systems. Whether or not there also was a temporary deficiency of available nitrogen in the soil, such as that which causes yellow-vein in otherwise healthy trees in Florida, is not clear, since the 1957 soil nitrogen status and rainfall were not given.

The results reported here in field trials and sand cultures show that nitrogen deficiency is the primary cause of yellow-vein in citrus. The fact that calcium is also low in yellow-vein leaves under most grove conditions appears to be merely incidental to the nitrogen deficiency. In grove trials, yellow-vein was corrected with nitrogen fertilizers, but was not corrected by calcium; however, there appears to be a close relationship between nitrogen and calcium utilization by the trees. This is in agreement with the work of Parker and Truog (8), who found with many kinds of plants that calcium increases more regularly with increasing nitrogen than any of the other elements. Spencer (12) noted yellow-vein on Ruby Red grapefruit trees during the past winter in calcium-deficient field plots at Lake Alfred. While the leaves contained a very low 0.25 percent calcium, they also were deficient in nitrogen with 1.67 percent nitrogen. Since these trees received the same nitrogen fertilization and the same rainfall as those in nearby plots that showed no yellow-vein, it appears that calcium deficiency in some way interfered with the uptake or assimilation of adequate nitrogen. The yellow-vein disappeared during the spring without addition of any calcium.

The average calcium in leaves from yellow-vein branches of young grapefruit trees given four different levels of amomnium sulfate and sodium nitrate, which contain no calcium, was equal to that obtained from 8 pounds of calcium chloride per tree. Nitrogen fertilizer increased the nitrogen content of the leaves and corrected the yellow-vein. Addition of calcium without nitrogen did not increase the nitrogen in the leaves and did not correct the yellow-vein, even though the leaf calcium was increased.

In the field, ammonium nitrogen applied as ammonium sulfate corrected yellow-vein more rapidly and gave higher leaf nitrogen than either sodium nitrate or calcium nitrate. Similarly, Tiedjens (13) found that ammonium ions were immediately absorbed by apple and tomato plants without further change, and were synthesized to amino acids and other organic nitrogenous materials directly and more rapidly than the nitrate ion. Wallace and Mueller (14), using nitrogen isotope techniques with Rough lemon cuttings grown in sand culture, applied nitrate and ammonium nitrogen in different ratios. They found that when nitrate and ammonium were applied in equal amounts the plants absorbed twice as much ammonium as nitrate nitrogen. As an average for all treatments the ratio of ammonium to nitrate absorption was 1.84.

Sand culture studies confirmed the causal relationship between nitrogen and yellow-vein.

The close relationship between leaf nitrogen and calcium found in the field, however, was not found in sand culture. In sand culture the yellow-vein leaves generally contained more calcium than green leaves, while in

Table 5. Effect of two calcium sources on the nitrogen and calcium content of leaves from pink grapefruit trees affected with yellow-vein[1].

Calcium Source	Lbs. per Tree	Y-V Leaf Pattern When Treated	Y-V Leaf Pattern When Sampled	N %	Ca %	K %
$CaCl_2$	5	Severe	Moderate	1.79	2.40	1.75
	5 (twice)	Severe	Moderate	1.72	2.90	1.67
	8	Severe	Moderate	1.78	2.97	1.66
Average				1.76	2.76	1.69
Gypsum	20	Severe	Moderate	1.69	2.39	1.71
($CaSO_4.2H_2O$)	30	Severe	Moderate	1.71	2.48	1.60
Average		Severe	Moderate	1.70	2.44	1.66
Check	None	Severe	Moderate	1.79	2.25	1.97

[1]$CaCl_2$ applied January 23, 1956. Second application of 5 + 5 series made March 2, 1956. Gypsum applied February 15, 1956. Sampled March 22, 1956.

Table 6. Effect of nitrogen and calcium nutrition on yellow-vein on budded Ruby Red grapefruit and Parson Brown orange trees grown in sand culture.

Treatment Number	Treatment	Tree Condition When Sampled	N %	Ca %	K %
	Grapefruit				
1	Complete nutrient solution	Green	3.71	1.64	1.51
2	–N for 6 mos., then +N	Green[1]	4.06	1.61	1.39
3	–N throughout	Yellow-veined	1.60	1.86	2.62
4	–Ca throughout	Green	3.29	1.11	2.56
5	–N, –Ca throughout	Yellow-veined	1.74	1.61	2.49
6	–N, –Ca 6 mos., then +Ca	Yellow-veined	2.01	1.72	2.76
7	–N, –Ca 6 mos., then +N	Green[1]	3.24	1.26	2.16
8	–N, –Ca 6 mos., then +N, +Ca	Green[1]	3.49	1.47	2.58
	Oranges				
9	Complete nutrient solution	Green	4.24	1.98	1.21
10	–N for 6 mos., then +N	Green[1]	4.09	1.99	1.35
11	–N throughout	Yellow-veined	1.58	2.83	2.44
12	–Ca throughout	Green	4.15	1.31	1.49
13	–N, –Ca 6 mos., then +N	Green[1]	3.99	1.44	1.85
14	–N, –Ca 6 mos., then +Ca	Yellow-veined	1.70	2.22	2.38
15	–N, –Ca throughout	Yellow-veined	1.72	1.91	2.76

[1]Trees showed severe yellow-vein in January, 1956, after receiving a nutrient solution containing all known essential elements except nitrogen (or except nitrogen and calcium) since July, 1955. The yellow-veined leaves started greening about two weeks after nitrogen was added in January, and were completely green in 6 to 8 weeks. Analyses are averages of three trees. Leaves sampled April 17.

BE SURE about Pest Controls

Consult your Swift's Crop Advisor *Now!*

Even a moderate insect infestation can seriously damage your crop, causing you untold trouble and loss. The time to stop an infestation is before the insect population begins to build up.

Your Swift Crop Advisor is trained to anticipate insect danger in your crops. He will recommend the best control measures to use. It's to your advantage to consult your Swift Crop Advisor now. Ask him about Swift's complete one-source plant food and pesticide program.

GOLD BEAR

Swift **Gold Bear** pesticides and weed killers are made from the finest ingredients tested and proved . . . all are special formulations designed for your area to assure uniform, trouble-free application under your local conditions.

There's a SWIFT Crop Advisor near you—phone him now!

R. V. ALBRITTON
108 Fernvale, Sebring
Phone: EVergreen 5-3734

L. J. BATES
1905 18th St., N.W.
Winter Haven
Phone: CYpress 3-3317

P. J. DRISCOLL
P.O. Box 333, Clermont
Phone: EXeter 4-5401

J. M. FENNELL
P.O. Box 295, Tice
Ft. Myers
Phone: OXford 4-1039

C. C. HELMS
P.O. Box 301, Perrine
Phone: CEdar 5-2920

P. L. HEPBURN
P.O. Box 537, Frostproof
Phone: 6563

H. L. JOHNSON, JR.
P.O. Box 1097, Bartow
Phone: 533-6182

M. D. JOHNSON
4013 S.W. 23rd Ter.
Ft. Lauderdale
Phone: LUdlow 14226

D. V. MacMILLAN
989 Eastbrook Blvd.
Winter Park
Phone: MI 7-2146

O. E. NORRIS
P.O. Box 731, Ruskin
Phone: 47-7605

R. S. PIKE
P.O. Box 124, Vero Beach
Phone: JOrdan 7-2375

P. M. SCHAILL
219 N. Pine St., Ft. Meade
Phone: ATwater 4-4151

D. K. WEBB
P.O. Box 712, Arcadia
Phone: WAlnut 9-1733

R. L. WILSON
243 S.E. 7th Ave.
Deerfield Beach
Phone: Boca Raton 5357

E. L. WOOD
1124 S.W. 9th Rd.
Gainesville
Phone: FRanklin 6-7064

Swift
AGRICULTURAL CHEMICAL DIV.

SWIFT & COMPANY • Agricultural Chemical Division
Pompano Beach, Winter Haven

the field calcium was nearly always much lower in the yellow-vein leaves than in green leaves.

Although various workers have listed yellow-vein as one of several leaf symptoms found in boron-deficient citrus, this symptom does not always occur with boron deficiency and is not specific for it. When it does occur in solution or sand culture where presumably adequate nitrogen is supplied, the boron deficiency may interfere in some way with the uptake or assimilation of nitrogen by the affected leaves. A similar effect on nitrogen nutrition was noted by Spencer (12) with calcium deficiency in the field. Smith and Reuther (11) found yellow-vein in a boron-deficient Florida orange grove early in March, and attributed this symptom to boron deficiency. Its presence at that time of year suggests that this probably was the cold-weather type of yellow-vein caused by a temporary deficiency of nitrogen in the soil. That is, the grove probably was deficient in nitrogen as well as in boron.

The type of yellow-vein involved in the work reported here is caused by a deficiency of nitrogen in the leaves of otherwise healthy trees, but the symptom seems to be associated with cold weather. The symptoms usually appear, therefore, late in December or in January during winters featured by cold periods in November or December. The actual deficiency of nitrogen is believed to be caused by heavy leaching of soil nitrogen by the summer and fall rains, followed by insufficient rainfall after the fall fertilization to move the nitrogen down to the tree roots. It can be corrected by liberal nitrogen fertilization, followed by irrigation if rainfall is inadequate. Such treatment should be applied promptly after the condition is discovered to avoid increasing severity of the yellow-vein and resulting premature drop of many leaves.

Summary

Yellow-vein in citrus, except when caused by disease, or by injury to bark or roots, is found in Florida only during the winter after a period of cold weather. Yellow-veined leaves from affected groves were always lower in nitrogen and nearly always lower in calcium than green leaves. No important differences were found between magnesium, phosphorus, boron or potassium contents of yellow-vein leaves and green leaves.

Yellow-vein was corrected in the field with nitrogen fertilizers. Ammonium sulfate gave more rapid greening and higher total leaf nitrogen than equivalent amounts of sodium nitrate or calcium nitrate. Calcium sources without nitrogen did not green the yellow-vein leaves.

Yellow-vein was produced on budded grapefruit and orange trees in sand culture by withholding nitrogen from July to January in two consecutive years. In both years, it was subsequently corrected by adding nitrogen in solution. When both nitrogen and calcium were withheld from July to January, addition of nitrogen alone or nitrogen plus calcium greened the leaves, but addition of calcium alone failed to green them. Withholding calcium for two years failed to produce yellow-vein, but most of the trees died from calcium deficiency. Yellow-vein was not produced by withholding boron for 20 months. It was concluded that nitrogen deficiency is the primary cause of yellow-vein in citrus.

LITERATURE CITED

1. Chapman, H. D., S. M. Brown and D. S. Rayner. 1945. Nutrient deficiencies of citrus. Calif. Citrograph **30**: 230-231, 246. (June, 1945.)
2. Chapman, Homer D., and Albert P. Vanselow. 1955. Boron deficiency and excess. Calif. Citrograph **40**: 455-460.
3. Cooper, William C., Edward O. Olson, and A. V. Shull. 1959. Yellow-vein chlorosis of old-line and young-line red grapefruit trees on various rootstocks. Jour. Rio Grande Valley Hort. Soc. **13**: 81-88.
4. Hass, A. R. C. 1929. Effect of boron on the growth of citrus. Calif. Citrograph **14**: 355.
5. Klotz, L. J., and H. S. Fawcett. 1948. Color Handbook of Citrus Diseases. Univ. of Calif. Press, page 96 and Plate 34.
6. Merwe, A. J. v.d. and F. G. Anderssen. 1937. Chromium and manganese toxicity. Farming in South Africa (November), pages 439, 440.
7. Morris, A. A. 1937. Boron deficiency. Annual report for 1936, Mazoe Citrus Experimental Station (The British South Africa Company, Publication No. 6), pages 146-153.
8. Parker, F. W. and E. Truog. 1920. The relation between the calcium and the nitrogen content of plants and the function of calcium. Soil Sci. **10**: 49-55.
9. Pratt, Robert M. 1958. Florida guide to citrus insects, diseases, and nutritional disorders in color. Florida Agr. Exp. Station, page 56 and plate 37.
10. Roy, Wallace R. 1943. Studies of boron deficiency in grapefruit. Proc. Fla. State Hort. Soc. **56**: 38-42.
11. Smith, Paul F., and Walter Reuther. 1949. Observations on boron deficiency in citrus. Proc. Fla. State Hort. Soc. **62**: 31-37.
12. Spencer, W. F. 1960. Unpublished data, Florida Citrus Experiment Station, Lake Alfred.
13. Tiedjens, Victor A. 1934. Factors affecting assimilation of ammonium and nitrate nitrogen, particularly in tomato and apple. Plant Physiology **9**: 31-57.
14. Wallace, A. and R. T. Mueller. 1957. Ammonium and nitrate nitrogen absorption from sand culture by rough lemon cuttings. Proc. Amer. Soc. Hort. Sci. **69**: 183-188.

Table 7. Nitrogen, calcium, and boron nutrition as related to yellow-vein on budded Ruby Red grapefruit and Parson Brown orange trees grown in sand culture.

Treatment Number	Treatment	Tree Condition When Sampled	% N	Ca %	K %	B ppm
	Grapefruit					
1	Complete nutrient solution	Green	2.78	3.06	1.06	40
2	−N 6 mos., then +N as NH_4NO_3	Green[1]	2.70	3.79	0.61	113
3	−N 6 mos., then +N as $(NH_4)_2SO_4$	Green[1]	2.23	2.94	0.96	88
4	−N 6 mos., then +N as $Ca(NO_3)_2$	Green[1]	2.09	5.79	0.63	95
5	−Ca throughout	Green	3.06	0.38	1.38	50
6	−Ca 20 mos., then +Ca	Green	2.95	1.78	0.85	45
7	−B 10 mos.	Green	2.88	2.25	1.19	15
	Oranges					
8	Complete nutrient solution	Green	3.00	3.81	1.19	—
9	−N 6 mos., then +N as NH_4NO_3	Green[1]	3.15	2.62	1.56	60
10	−N 6 mos., then +N as $(NH_4)_2SO_4$	Green[1]	2.88	2.88	0.81	60
11	−N 6 mos., then +N as $Ca(NO_3)_2$	Green[1]	2.68	3.50	1.69	50
12	−Ca throughout	Green	3.24	0.31	2.25	—
13	−Ca 20 mos., then +Ca	Green	3.15	1.94	1.19	35
14	−B 10 mos.	Green	3.18	3.25	1.38	25

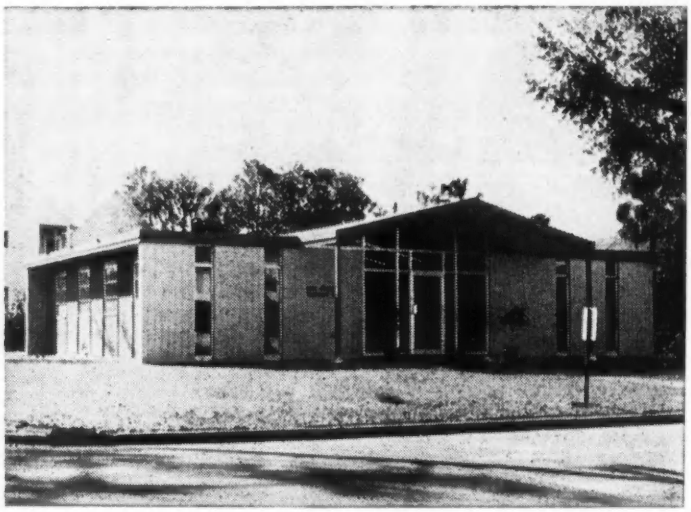
[1]Trees showed severe yellow-vein in January, 1957, after receiving a nutrient solution containing all known essential elements except nitrogen (or except nitrogen and calcium) since July, 1956. Leaves sampled August, 1957.

GRIERSON NAMED TO NEW POST

A new service to the citrus industry has been announced by Earl W. Carlsen, president and director of Food Industries Research & Engineering. This firm has expanded its consulting service to include all aspects of citrus fruit handling and design of citrus packing and processing plants. At the same time it was announced that Dr. William Grierson, just recently in charge of fruit handling section at the Florida Citrus Experiment Station, Lake Alfred, will become associate director of citrus consulting for Food Industries Research & Engineering. Offices for the new citrus service will be at Winter Haven, Florida.

—BUSINESS NOTES—

Lake Garfield Nurseries Co., Moves Into New Bartow Home



Lake Garfield Nurseries Company, one of the largest and oldest citrus nurseries in Florida, has recently moved into newly constructed offices at 585 East Summerlin Street in Bartow.

Designed by Pickett and Parlier, Bartow architects, and constructed by Kenneth Balliet, Lake Wales contractor, the brick and frame building contains approximately 1500 square feet and is heated and air conditioned electrically.

Since it was founded in 1915 by the late Vet L. Brown, Lake Garfield Nurseries Company has provided literally millions of citrus trees for growers in all parts of Florida's citrus belt, gaining a reputation throughout the years for being a consistent producer of the highest quality nursery stock.

In 1931, offices of the nursery were located in the Record Building on South Central Avenue. The company moved to 230 East Summerlin Street in June, 1934, where it remained until the completion of its new quarters in December.

The company's nurseries were located in the Lake Garfield section southeast of Bartow from 1915 until 1955. At that time, however, the continuing demand for Lake Garfield trees and the company's policy of growing its nursery stock on virgin land, necessitated a move to the Babson Park area where more than 500 acres are available for development as nurseries and citrus groves.

President of the company since May, 1955, has been R. L. Bryan, who came to Bartow from Zephyrhills in 1916. Serving as vice-president and general manager is J. F. Alexander, with Lake Garfield since 1933. Vice-president and grove production manager is Don S. Bryan, while Leland R. Bryan is vice-president and nursery production manager. L. W. Clements, Jr. serves as secretary-treasurer and nursery sales manager.

GARRY MOORE TO ENTERTAIN AT FLORIDA CITRUS EXPOSITION

Garry Moore, who plays to a television audience of 25,000,000 persons a week, will originate three of his national telecasts from Florida in March for a total of 75,000,000 persons.

With a cast and crew of 119 persons Garry Moore will make his studios the grounds of the industry-sponsored Florida Citrus Exposition.

It is the second time the television star invades the citrus industry. He originated his former morning show and "I've Got A Secret" program from the Citrus Exposition grounds in 1957.

This year, with the co-operation of the Florida Citrus Commission and the City of Winter Haven, Moore brings to Florida his hour-long Tuesday night variety show and his "I've Got A Secret" program which is viewed on Wednesday night.

Tentative plans call for three of Moore's shows to originate from Florida. The first, "I've Got A Secret" will be taped at the Florida Citrus Exposition at 7:30 p.m. March 15, flown to Tampa and shown on the CBS network at 9:30 the same night.

A second "I've Got A Secret" show will be put on video tape and then aired on the night of March 22.

Moore's hour-long variety show—which may be filmed in two halfhour segments—will be seen by a national audience on March 28.

Actually it may mean that the tens of thousands who come to see the industry show here from March 11 to 18 will see Moore's programs being produced on four separate days or nights.

Under the Neilson ratings—which rank television shows—Moore's hour-long variety show is viewed by nearly 25,000,000 persons while "I've Got A Secret" has an audience rating of nearly 25,000,000.

Tentative plans call for Florida, its outdoors, and the citrus industry to be features of the shows.

Today's farms are becoming more like small industrial plants, according to the National Safety Council — and they have some of the same safety needs.

BEST GROWERS AGREE . . . GROW WITH GULF!

A citrus top dresser is an important part of any grower's program at this time. Your Gulf Field Representative can provide sound recommendations for your grove.

THE GULF FERTILIZER COMPANY

Tampa, Florida

SERVING FLORIDA AGRICULTURE FOR 57 YEARS

FRIENDLY GULF FERTILIZERS and pesticides

Perfect Citrus Profit Picture!

When you knock out Nematodes with D-D® or Nemagon®

SOIL FUMIGANTS

You can get bigger and better citrus yields when your trees are free of root damaging nematodes. And you can knock out those nematodes with D-D or Nemagon Soil Fumigants—help restore vigor to your citrus trees.

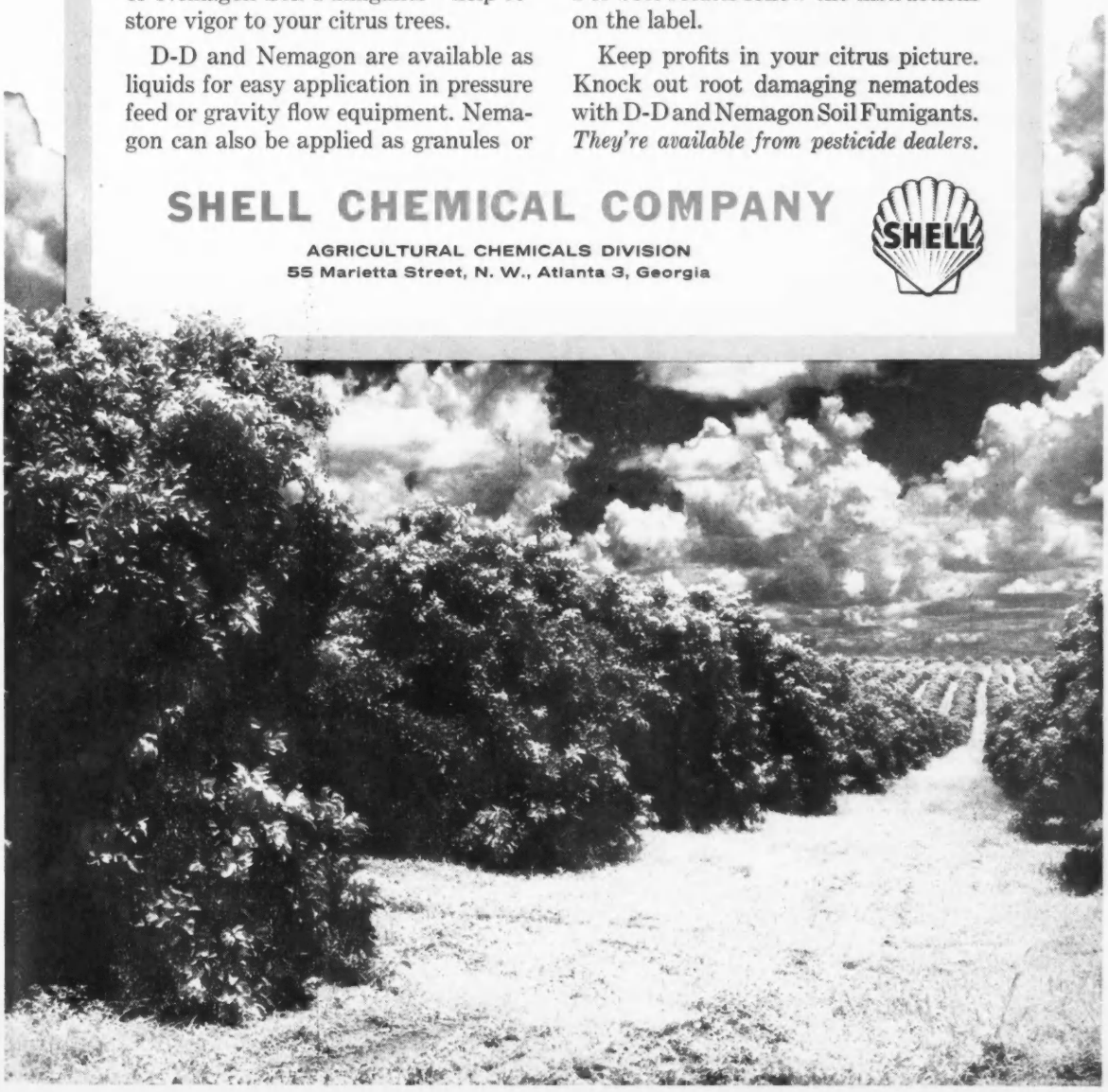
D-D and Nemagon are available as liquids for easy application in pressure feed or gravity flow equipment. Nemagon can also be applied as granules or mixed with fertilizer for one time-and labor-saving application. Once in the soil, D-D and Nemagon become potent gases, killing nematodes as they spread. For best results follow the instructions on the label.

Keep profits in your citrus picture. Knock out root damaging nematodes with D-D and Nemagon Soil Fumigants. *They're available from pesticide dealers.*

SHELL CHEMICAL COMPANY

AGRICULTURAL CHEMICALS DIVISION
55 Marietta Street, N. W., Atlanta 3, Georgia

SHELL



CITRUS INSECT CONTROL FOR SPRING 1961

(Continued from page 3)

spray or prior to the summer scale spray.

The selection of a rust mite miticide for the post-bloom spray depends upon the other problems to be solved and upon the other materials in the spray. The use of each miticide will be discussed in detail, but in general, zineb is preferred except where rust mite is numerous and where copper is also employed. Chlorobenzilate is preferable to zineb in sprays containing copper.

Zineb: Zineb is as effective today as it was four years ago and is capable of the longest control of rust mite of all the available miticides. It is not perfect, however, and is of little value when improperly used. One of the deficiencies of zineb is its complete lack of fumigating properties. Zineb kills rust mite only by contact and must reach the mites because the mites do not move from unsprayed to sprayed surfaces in sufficient numbers to produce a quick clean-up. It would seem that thorough-coverage sprays should produce a good clean-up, but such is not the case. Although it is not difficult to wet leaves and twigs with the usual thorough application, it is almost impossible to cover all fruit surfaces, especially on grapefruit. The backs of fruits and areas between fruits are not sprayed. Consequently, rust mites on these areas are not destroyed and poor control is the result. Zineb therefore never be used once rust mites have become numerous on fruit. On the contrary, the only way to use zineb effectively is to apply each application when rust mites first appear.

A second deficiency of zineb lies in the fact that its effectiveness is reduced by copper compounds because of a chemical reaction between the two. Although zineb-copper mixtures should be avoided, occasionally they are desirable. In such cases the dosage of zineb should be 1.0 pound per 100 gallon. This amount with copper will give slightly longer control than sulfur when applied thoroughly and before rust mite is numerous, but will not last as long as 0.5 pound of zineb without copper.

There is very little difference in the interval of control between 0.5 and 1.0 pound of zineb per 100 gallon, but there is enough to be significant when post-bloom is early. If the post-bloom spray is applied in March or early April, 1.0 pound of zineb is preferable. On the other hand, 0.5 pound of zineb applied near the end of April or later should last at least until July first.

Zineb-Sulfur Mixtures: Sulfur at 5.0 pounds per 100 gallon may be used in zineb sprays to improve the initial kill of rust mite. Zineb-sulfur mixtures are thus superior to zineb where rust mites are numerous and are useful where Brevipalpus and broad mites are added problems.

Chlorobenzilate: Chlorobenzilate at 0.5 to 1.0 pound of wettable powder or 0.5 to 1.0 pint of the liquid formulation is an effective rust mite miticide, but does not give as long control as zineb. It is preferable to zineb where copper is used and where rust mites are numerous. The higher dosage of Chlorobenzilate is desirable only in March and early April. Either dosage may be used with oil and other materials used on citrus.

Sulfur: The use of sulfur should be kept to a minimum because it increases citrus red mite populations and repeated applications or excessive amounts increase the number of purple and Florida red scales. However, the dosage of 5.0 pounds of wettable sulfur per 100 gallon is useful in post bloom sprays that contain copper, as a supplement to zineb where rust mites are numerous, in extra sprays for rust mite control between the post-bloom and summer applications, and where Brevipalpus mites and broad mites are also a problem. Early post-bloom applications of sulfur, however, usually have to be repeated in May or June.

Combination Miticides: Trithion and Ethion are sometimes useful in post-bloom sprays where both spider mite and rust mite control is desired. Both materials are similar to sulfur in effectiveness against rust mite and should be combined with zineb where longer control is desired. Trithion and Ethion should not be used with oil, but may be used with other materials. Use of Ethion is restricted to two applications a year. Both materials should be used in the post-bloom spray at the dosage of ¾ pint of 1.5 pounds per 100 gallon.

Kelthane is not as satisfactory as Trithion or Ethion and should be used with zineb. Like Trithion and Ethion, however, Kelthane is of value for combined mite control in extra pre-summer applications where only a short period of control is required.

Brevipalpus Mites

Two Brevipalpus mites occasionally occur on Florida citrus. One of these is associated with leprosis or nail head rust. Neither the mites nor leprosis are a general problem, but both have occurred in a few groves. Control measures are desirable in groves with a history of leprosis, particularly where sulfur was not used in a dormant spray. Zineb does not control Brevipalus mites, but sulfur is excellent. Chlorobenzilate is also reported to be excellent, but has not been tested under Florida conditions.

Broad Mite

Broad mite occurs occasionally and causes an injury similar to russet produced by rust mite. Broad mite does not occur every year, is usually only a spring problem on fruit about an inch or less in diameter, and is usually confined to groves on low land or adjoining wet areas. Groves in such areas and those with a history of broad mite injury should receive a post-bloom application of sulfur. Zineb does not control this mite.

Scale Insects, Mealybug and Whitefly

It is often a question of whether a post-bloom scalicide is justified when trees have very few scales on them. Purple scale is now of minor importance in most groves, but there are other insects that may cause considerable damage. The addition of a scalicide to the post-bloom spray should be considered inexpensive insurance against scale insects, mealybug and whitefly. A post-bloom scalicide is definitely in order where there is a noticeable carry-over of red scale because this scale will infest fruit soon after it has set. If the scales are allowed to accumulate on the fruit, poor control may result from

the summer scalicide and necessitate a fall application.

Tangerines should definitely receive a post-bloom scalicide to keep the fruit free of chaff and purple scale because both of these scales cause an injury on the fruit that will not degreen, even in the coloring room. These green spots are a grade-lowering factor. Temples, early varieties of oranges, and grapefruit should also receive a scalicide where either chaff or purple scale is present.

A whitefly infestation can be substantially reduced with a post-bloom scalicide. Sooty mold should not be a problem if the spring infestation of whitefly is reduced to a minimum and the summer scalicide is applied after the summer brood of adult whitefly has deposited eggs.

Scalicides should be thoroughly applied before the young scales move to the fruit. Where mealybug control is needed it is especially important to spray before the calyx fits close to the fruit because sprays do not contact mealybugs under a tight calyx.

Scalicides: There are several scalicides and combinations that can be used. Each one has advantages and disadvantages. Parathion or malathion are both effective, much safer than oil as far as the tree is concerned, and are recommended in preference to oil during the post-bloom period. They are not so likely to cause leaf drop or drop young fruit and may be used with neutral compounds of zinc, copper and manganese as well as borax, lead arsenate and all miticides except Trithion and Ethion. Neither parathion nor malathion will control spider mites or rust mite. Use 0.25 pound of actual parathion per 100 gallon or 1 to 1.5 pounds of malathion. Where fruit is present do not apply parathion within 14 days of harvest or malathion within 7 days of harvest.

Oil sprays containing 1.3% actual oil are effective scalicides and also control spider mites, but often cause leaf drop and drop of young fruit during dry weather or when there is a wind with low humidity. Although neutral copper compounds may be used with oil, copper-oil sprays are not recommended. Such mixtures often result in fruit burn, leaf drop, poor disease control and increase the fall purple mite problem.

No more than one metallic compound should be used with an oil emulsion except that lead arsenate may be added to copper-oil on grapefruit.

Two scalicide mixtures are also satisfactory for post-bloom use. These are oil emulsion, 0.7% actual oil with either 0.15 pounds of parathion per 100 gallon or with 0.5 to 0.75 pound of actual malathion. The oil-parathion mixture may cause as much leaf drop as 1.3% oil, but the oil-malathion mixture has been less harmful.

Formerly not more than one oil spray per year was recommended and it is still advisable not to use a concentration of 1.3% oil more than once per year. However, the reduced dosage of 0.5% to 0.7% oil combined with either parathion or malathion and applied post-bloom and summer has had no apparent effect on the trees and fruit color has been good. Oil, regardless of the concentration, is not recommended when the average size of fruit is between 0.75 and 1.25 inches in diameter because it may cause oil blotch in this size range.

Aphids

Aphid control on young trees is important because maximum leaf growth is essential for fast growing trees. Control measures should be taken before 10 to 15 percent of the trees are infested to prevent a high percentage of leaves from being curled. A second and possibly a third aphicide application may be necessary if new growth is slow in maturing.

Systox at one pint per 100 gallon is probably the most effective aphicide from the standpoint of residual effect. Other insecticides that are effective include 0.5 pound of actual malathion per 100 gallon, 0.15 pound of actual parathion and 1 pint of 40% nicotine sulfate plus a spreader. Lindane and TEPP have aphicidal properties and should be used according to manufacturers' directions.

Spider Mites

The usual post-bloom outbreak of citrus red mite (purple mite) and to a lesser extent Texas citrus mite, can usually be prevented with 0.7 to 1.2% oil. Other miticides such as Trithion and Ethion usually do not last from post-bloom until time to apply the summer scalicide. Kelthane is less effective than either Trithion or Ethion.

Although citrus red mite and Texas citrus mite will severely dull citrus foliage, it will rarely cause a severe leaf drop at this time of the year in healthy groves as long as soil moisture is extremely low.

Six-spotted mite may be controlled with materials used for purple mite, but more thorough coverage is needed for satisfactory results.

Residues and Tolerances

The Federal Food and Drug Administration has established tolerances on amounts of certain pesticide residues that can remain on citrus fruits. In order to produce fruit free of illegal residues, it is necessary to observe all restrictions such as waiting periods given on manufacturer's labels.

Consult the 1961 Better Fruit Program or contact the Citrus Experiment Station at Lake Alfred or Fort Pierce.

1960 ENROLLMENT IN FLORIDA'S 4-H CLUBS TOTALED OVER 42,000

Florida's 4-H Club enrollment at the end of 1960 was 42,541, including white and Negro boys and girls, according to the Florida Agricultural Extension Service.

These boys and girls are members of 1,749 clubs throughout the state. This youth program is now active in 66 of Florida's 67 counties.

Girls outnumber the boys in the program, with most of them coming from urban homes. Next in number of girls are from rural non-farm homes, with farm homes bringing up the rear.

In the base of boys, the situation is reversed. Farm youths outnumber the rural non-farm members, which in turn outnumber the urban 4-H'ers. Only in the case of farm home members do the boys outnumber the girls.

Nearly 6,000 boys and girls attended 4-H Club camps in Florida during 1960.

READ —

Daily Devotions for Busy Folk

an inspiring new pocket size book by

Paul Arnold Peterson, D.D.

Pastor — Community Church

Babson Park, Florida

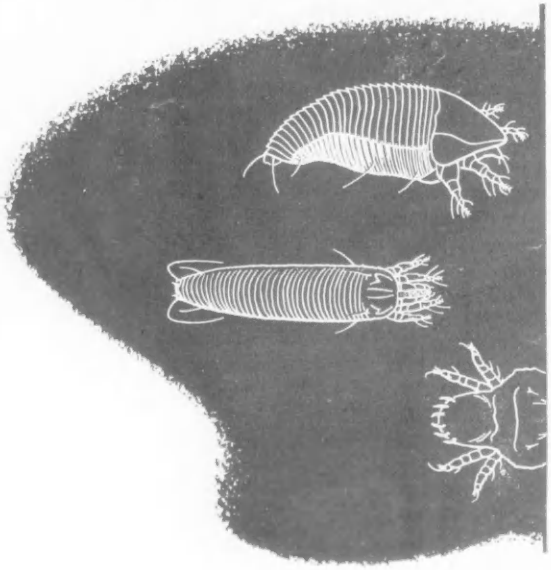
For your copy send $1.25 to:

Daily Devotions

Box 120 — Bartow, Florida

Florida Citrus Growers

Stop mites



safely

effectively

economically

with

CHLOROBENZILATE

miticide

Chlorobenzilate is the preferred miticide in sprays which include copper.

- long residual action
- low cost protection
- controls phosphate resistant strains
- effective against all growth stages of mites
- safety to man and animals — to bees under normal field conditions
- non-irritating to skin

Order now from your supplier.

Grapefruit, Oranges, Tangerines: Rust Mite; Flat Mite; Six-Spotted Mite; Texas Citrus Mite; Citrus Red Mite (Purple Mite).
Lemons: Bud Mite; Rust Mite.

Geigy *ORIGINATORS OF DDT INSECTICIDES*

GEIGY AGRICULTURAL CHEMICALS • *Division of Geigy Chemical Corporation* • Saw Mill River Road, Ardsley, N.Y.

Cost of Picking And Hauling Florida Fruits, 1958-59 Season

BY A. H. SPURLOCK
Agricultural Economist
Dept. of Agri. Economics
Fla. Agri. Exp. Sta., Gainesville

Introduction

This is the ninth annual summary of costs of picking and hauling citrus fruits, prepared from a sample of citrus dealers, packers, and processors.

Costs of handling citrus fruits from the tree to the packing or processing plant for the 1958-59 season were summarized for 32 firms by type of friut. Services covered were: (1) Buying and selling, (2) picking, which included delivery to the roadside and loading in the truck, and (3) hauling from the grove to the plant. Nine of the firms furnishing data were citrus dealers specalizing in the procurement, sale, and delivery of fruit to the processing plant and 23 were principally packers of fresh fruit or processors. Most of the dealers also contracted with other operators to pick and haul some of their volume. Contracting with other operators to pick and haul part or all of their volume also was common among the fresh fruit packers and processors.

The number of firms included by location was Polk County, 11; Orange County, 9; Lake County, 5; Pinellas County, 3; and one each in Hillsborough, Pasco, Seminole, and Hernando Counties.

Total volume of fruit handled varied widely among firms. Only six firms had less than 200,000 boxes, and nine firms had more than 1,000,000 boxes each. The average volume for the 32 firms was 954,000 boxes.

Costs of Picking and Hauling, 1958-59

These costs are weighted averages; that is, the total money costs of all firms are divided by the total number of boxes.

The distinction between citrus dealers and packers in methods of picking and hauling is perhaps not clear as it once was. Both groups commonly pull oranges and grapefruit instead of clipping. Also, packinghouses often pick and handle some fruit destined for canneries by bulk methods used by citrus dealers. A few packers also use bulk handling methods for the fruit which is packel fresh.

Buying and Selling

For specialized fruit dealers this is one of the services performed in procuring and delivering fruit to the processing plant. Many different types of arrangements are made with the grove owner as to the price of the fruit and method of

MEET OUR ¼ MILLION SALESMEN

Here they stand—row after row—½ mile long. The very best trees that can be grown—free of the viruses, psorosis and xyloporosis—with State Plant Board registration to prove it. Give us a chance to introduce you. Call us for an appointment.

All commercial varieties on all major rootstocks. Prices start at $1.40 for regular buds. All registered buds a flat $2.00 on orders of 100 or more. Special quotations on large orders.

SPECIAL—Several thousand extra large Pineapple and Valencia on rough lemon still available for replants.

FOR FURTHER INFORMATION CALL OR WRITE

WARD'S NURSERY, INC.

GLENDALE 3-4657 BOX 846 AVON PARK

measurement. Dealers buy and sell fruit they may pick and haul with their own crews, or they may contract with other similar operators to pick and haul, or to perform one or more services in the combined operation. They may also buy and sell fruit which is picked and delivered-in to their place of business.

The cost of buying and selling citrus fruits for 1958-59 averaged 3.58 cents per box for eight dealers. The average volume per firm was 555,214 boxes. The principal items of cost for providing this service were buyers' salaries and commissions, management costs, auto and travel expenses, and telephone and telegraph.

Buying and selling unpacked fruit is not a normal function of fresh fruit packinghouses and no cost for this service is shown for them. Some of the packers did have fruit procurement costs however.

Picking

This is the operation of getting the fruit off the tree and into the highway truck. The costs in this study represents the cost per box for the operator's own crews, but not for contract crews. The principal costs of performing this service are labor, fuel, repairs, licenses, insurance and depreciation for the grove trucks, crew trucks, loading machines and other picking equipment, and management and office salaries.

Picking costs, include all amounts paid for direct labor for picking and delivery to the roadside, grove truck expense, and a portion of overhead and management expense. Picking labor was allocated to the various types of fruit from payroll analysis and piece rates insofar as possible. Fuel and repairs were prorated on a box basis equally to all kinds of fruit. Certain overhead expenses, which tend to be fixed, were distributed between the several types of fruit in the inverse ratio of the usual number of boxes picked per day by a picker. The average of these estimates by operators placed two-thirds as much overhead per box on grapefruit, and twice as much on tangerines as on oranges.

Total picking costs for nine citrus dealers picking oranges averaged 32.25 cents per box, and for nine dealers picking grapefruit averaged 22.74 cents. Only two of these operators picked tangerines with their own crews, and these costs are omitted. Labor, including workmen's compensation insurance and payroll taxes, was the largest item of cost in picking fruit, being approximately 81 percent of the total for both oranges and grapefruit.

For 23 fresh fruit packinghouses and processors, which operated their own crews, total picking costs for oranges were 33.83 cents per box, and for grapefruit 24.57 cents. Total picking costs for tangeringe averaged 74.75 cents per box. As with the citrus dealers, the principal items of picking costs for the packers were labor, gas and oil, repairs, licenses, insurance, depreciation, and rent of equipment. These items were usually complete in the records of the packinghouses, but some of the smaller overhead items were not complete. Frequently such items as telephone, office expense, lights and water, interest, management and office salaries were charged entirely to the packing operation and none allocated to picking and hauling.

Hauling

This operation refers to hauling fruit from roadside to the processing plant or fresh fruit packinghouse. It includes also the hauling of packinghouse eliminations to the cannery, this being counted as a separate haul. This is usually a somewhat less expensive haul than from grove to plant, according to operators. One of the reasons for this is heavier loading of trucks. Hauling does not include the use of trucks in the grove, this being considered a part of the picking and loading operation.

Hauling costs for eight citrus dealers with an average volume of 968,977 boxes were 13.64 cents per box for 1958-59. This is a composite cost for all kinds of fruit hauled. Twenty-one packinghouses or processors operating their own trucks had an average cost of 10.69 cents per box. The average volume for these firms was 1,050,241 boxes. Hauling costs per box does not appear to be related to total volume hauled. It is perhaps affected more by the volume per truck owned, and by average distance of haul, as well as by the proportion of box fruit and tangerines hauled.

Most operators stated that hauling costs are about equal for oranges and grepefruit, but higher for tangerines because of the lighter loading required.

Picking and Hauling Costs Combined

Many citrus firms, both dealers

(Continued on Page 24)

It pays
to buy from
Superior
"THE FOLKS WITH
KNOW-HOW
Now is the time to start planning your spring fertilization and spraying of citrus groves . . . and the people who can best help you plan are the representatives from SUPERIOR!
WARNING! — an unwelcome visitor is back. For the first time in many years SCAB can be a serious problem to citrus growers if not controlled properly. Two applications are necessary—one as soon as the buds swell, and the second at two-third petal fall, which occurs during post-bloom time. Consult your SUPERIOR field representative for advice about this serious problem now at no obligation.
Superior
FERTILIZER AND CHEMICAL COMPANY
TAMPA - P.O. Box 1021, Ph. 4-4131
FORT PIERCE - P.O. Box 246, Ph. HOward 1-2230

FLORIDA ORTHO® CITRUS SPRAY PROGRAM

Dormant Spray *(December 20 to February 10)*

ORTHO Nutritional S-C-Z-Mn-B Spray No. 2	**Dosage:** 60 lbs./500 gals.	**Controls:** Citrus Rust Mite, Scab, Melanose, Copper, Zinc, Manganese, Boron Nutrition—Yellow Spot
ORTHO Sodium Molybdate	**Dosage:** 5 ozs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: ORTHO Spray Sticker has proven especially beneficial in sticking nutritional sprays.

Post Bloom Spray *(from ⅔ petal fall until fruit reaches ½" in diameter)*

ORTHOCIDE 50 Wettable	**Dosage:** 10 lbs./500 gals.	**Controls:** Fruit Set, Foliage Growth, Melanose, Scab, Black Scale, Florida Red Scale, Purple Scale, Citrus Rust Mite, Fruit Russet, Citrus Red Mite, Texas Citrus Mite, Six Spotted Mite, Aphids, Mealybugs, Fruit Worms
ORTHO Parathion 8 Flow Concentrate	**Dosage:** 20 ozs./500 gals.	
ORTHO Zineb 75 Wettable	**Dosage:** 3 lbs./500 gals.	
ORTHO Trithion 4 Flowable or ORTHO Ethion 4 Flowable	**Dosage:** 40 ozs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: In recent years, minor pests, including Aphids, Mealybugs, Fruit Worms, Black Scale, have become increasingly important to control. Parathion in the post bloom spray prevents the build-up of these pests. If preferred, ORTHO Malathion may be substituted.

Summer Spray *(July 1 to July 31)*

FLORIDA VOLCK Soluble Oil Spray	**Dosage:** 5 gals./500 gals.	**Controls:** Florida Red Scale, Purple Scale, Black Scale, Citrus Red Mite, Texas Citrus Mite, White Fly, Sooty Mold, Greasy Spot, Citrus Rust Mite, Fruit Russet
ORTHO Zineb 75 Wettable	**Dosage:** 5 lbs./500 gals.	

Note: Check with your local ORTHO Fieldman for other available phytonomic oil sprays. Florida Red Scale is best controlled between July 15 and July 31. If the interval between the Post Bloom Spray and the Summer Spray is extended to an aerial application of ORTHO Trithion 4 Flowable or ORTHO Trithion – Sulfur dust formulations may be needed for control of rust mites and spider mites prior to the Summer Spray.

Fall Spray *(October 1 to November 15)*

ORTHO Tedion 25 Wettable	**Dosage:** 2½ lbs./500 gals.	**Controls:** Citrus Red Mite, Texas Citrus Mite, Citrus Rust Mite, Fruit Russet
Chlorobenzilate 25 Wettable	**Dosage:** 2½ lbs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: In groves where greasy spot is a problem, protection of the late summer-early fall flush may be necessary. ORTHO PHALTAN 50 Wettable and ORTHO Copper 53 Fungicide combined with ORTHO Spray Sticker are recommended for this use. Consult your local ORTHO Fieldman for information on the proper rates and timing.

Florida growers acclaim ORTHO products in the ORTHO program

"We've found that all the ORTHO pesticides we've used are top-quality products. We have great respect for the ORTHO Citrus Program," says Fred Saunders, Production Manager for R. D. Keene, Winter Garden, Florida. Top-quality products specially formulated in Orlando and all the extra benefits of ORTHO Field Service are yours, when you buy the ORTHO Citrus Spray Program. That's why most Florida growers choose ORTHO.

ORTHO®

HELPING THE WORLD GROW BETTER

CALIFORNIA CHEMICAL COMPANY, ORTHO DIVISION P. O. Box 7067, Orlando, Florida T. M. REG. U.S. PAT. OFF.: ORTHO. ON ALL CHEMICALS, READ DIRECTIONS AND CAUTIONS BEFORE USE.

COST OF PICKING AND HAULING FLORIDA FRUITS, 1958-59 SEASON

(Continued from Page 22)

and packers, contract with other operators to pick or haul, or both. Contract picking and hauling was separated from the firm's own crews. Contracted picking for 1958-59 cost 38.2 cents per box, and contracted hauling averaged 9.90 cents, but the kind of fruit and particulars of the operation are unknown.

Picking costs and hauling costs in 1958-59 were somewhat higher for packinghouses and slightly lower for dealers than in the preceding season. However, the combined services of picking and hauling were little changed from 1957-58.

Variation in Cost Among Firms

Total cost varied rather widely among firms for providing the same service. Not enough is known about the individual firms' operations to provide much information about reasons for costs being high or low. The data do not show any consistent relationship between volume of fruit handled and level of costs. Costs at first seem to decrease with increasing volume but then tend to stabilize or even increase. In each volume group there is a wide range of costs for both picking fruit and for hauling, indicating the influence of factors other than volume. For hauling, the average distance hauled and the idle capacity of the equipment owned doubtless affected the over-all season hauling cost per box. For picking, costs cannot decrease beyond a certain point because of the large proportion of labor costs, some of which are price rates and do not fluctuate with volume picked. Firms with very low volumes—too low to efficiently utilize one crew — had very high picking costs. Picking costs in some of the largest operations also were higher than average.

Management decisions probably affected citrus picking and hauling costs to a considerable extent. The operation of picking and hauling fruit is only one segment of the total business operation, whether the firm be a citrus dealer, packinghouse, or processor. Obtaining a large and continuous volume of fruit may have advantages to the firm that outweigh the advantage of merely achieveing low cost in the picking and hauling operation.

Total picking costs for 9 citrus dealers and 22 packinghouses or processors varied from 26.2 cents to 45.5 cents per box for oranges, and from 19.1 cents to 34.7 cents per box for grapefruit. The range in cost for picking tangerines was from 59.4 cents to $1.02 per box for 22 firms.

Hauling costs for 8 citrus dealers and 21 packinghouses or processors varied from 7.0 cents to 28.2 cents per box.

For picking and hauling combined (but excluding buying and selling), costs for 28 firms, both dealers and packers, ranged from 32.6 cents to 72.5 cents per box for oranges. The model group of 14 firms had costs between 38.3 cents and 51.8 cents. Picking and hauling costs for grapefruit for 28 firms varied from 26.2 cents to 61.9 cents per box. The modal group of 14 firms had costs between 31.0 cents and 43.1 cents

(Continued on Page 26)

Willard E. Roe, veteran citrusman, elected to direct the 37th annual industry-sponsored Florida Citrus Exposition, said he anticipated a live audience of more than a hundred thousand persons at the 1961 show, March 11-18.

Maguire®
POWER IMPLEMENTS
OL 6-3010 OCOEE, FLA.

THANK YOU - GROVE OWNERS

WE DID IT FOR YOU and you showed your appreciation!

MAGUIRE'S 1st month of "DIRECT TO CONSUMER" sales was outstanding! THE BEST DECEMBER MAGUIRE EVER HAD! !

MAGUIRE "DIRECT TO YOU" sales saves you $300.00. The MAGUIRE tree hoe and power attachment now sold "DIRECT TO YOU" for $795.00, is exactly the same, grove proven tree hoe formerly sold through the dealers for $1095.00. We have **not** cheapened the design in any manner.

MAGUIRE "DIRECT TO YOU" service policy saves you time and money whenever you need service. MAGUIRE salesmen, conveniently located throughout Florida, are factory trained to offer you fast, competent service at lowest cost.

MAGUIRE "DIRECT TO YOU" parts policy saves you money whenever you need replacement parts. All MAGUIRE salesmen carry a stock of standard parts. MAGUIRE factory location assures fast, one day delivery to most Florida areas. In rare cases of extreme emergency, we have used the MAGUIRE airplane to rush needed parts to owners.

MAGUIRE is the oldest and largest tree hoe **and** banker manufacturer in Florida. MAGUIRE hoes and bankers are the best and most reliable.

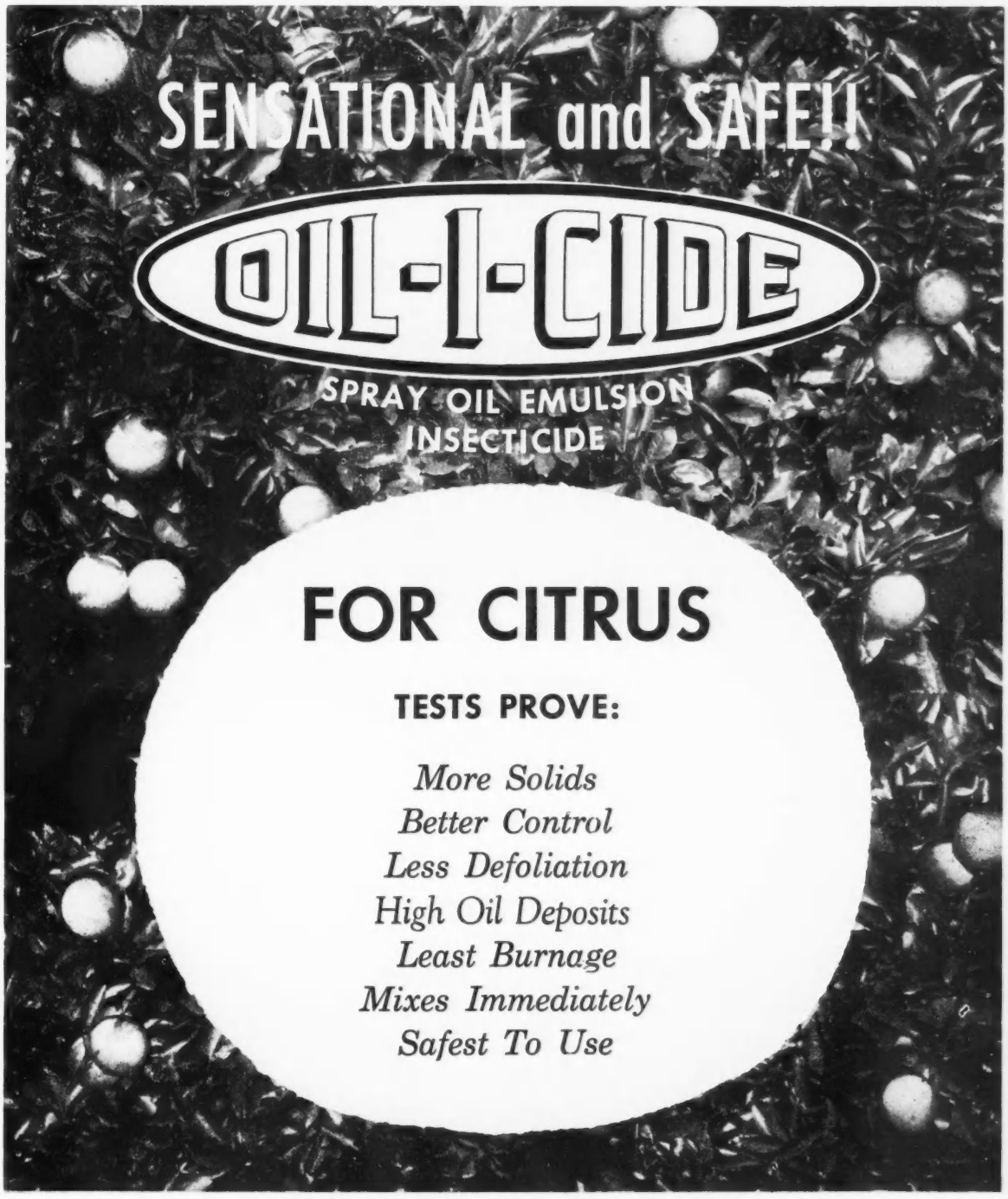
YOU owe it to yourself to see a demonstration of the MAGUIRE line.

CALL OR WRITE FOR A FREE DEMONSTRATION
IN YOUR GROVE TODAY!!

MAGUIRE POWER IMPLEMENTS, INC.

P. O. Box 637 — Ocoee, Florida

Winter Garden—OLympic 6-3010



DISTRIBUTED IN FLORIDA BY

SWIFT & COMPANY

WINTER HAVEN, FLORIDA

COST OF PICKING AND HAULING FLORIDA FRUITS, 1958-59 SEASON

(Continued from Page 22)

per box. Picking and hauling tangerines varied from 66.8 cents to $1.29 per box for 19 firms, with costs for 9 firms between 75.9 cents and 96.1 cents per box.

Comparison of 1958-59 Costs With Previous Seasons

Total picking costs for 1958-59 were about the same for all firms as a group as the averages of the preceding season. Citrus dealers had slightly lower costs and packinghouses and processors slightly higher costs for picking than in 1957-58.

Hauling costs for all firms were almost identical with the preceding season. Dealers had a small decrease in cost per box and packers and processors a small increase.

Some of the season-to-season variation in cost for each service is due to firms included. These have not remained identical each year, and as previously pointed out, costs vary widely between firms.

Explanatory Notes

Most of the items of cost are self explanatory, but a few comments may serve to clarify some classifications.

Labor cost was the amount paid by operators to their own crews for the service indicated. Field foremen were sometimes paid a weekly salary, and sometimes a per-box rate. Pickers were paid a piece rate per box, varying with the kind of fruit and the difficulty of picking. Most operators paid about 11 to 13 cents per box for picking grapefruit, 45 to 55 cents for tangerines, and around 17 cents per box for budded oranges. The rate for picking seedling oranges was 20 to 35 cents per box. Any condition which made picking more difficult usually required a higher picking rate. Loaders transfer the boxes of picked fruit from the ground to the grove truck. The boxes may be set on the truck floor, or poured into the truck body, depending upon the disposition intended for the fruit. Loaders were paid a piece rate per box—usually 2½ to 4 cents per box.

Several different methods of handling fruit in the grove were in use. Some firms used a tractor and 10-box containers to load the fruit directly into the highway truck, and some operators used a tractor and 25-box carts instead of grove trucks. These innovations eliminated the loaders and made the average rates shown for loading less per box than they would have been had all used the hand loading method.

Grove drivers were usually paid on an hourly basis. In some cases the foreman drove the grove truck. Highway drivers were paid a weekly wage in most cases, but sometimes a per-box rate. Their function was to drive the large trucks from the roadside to the citrus packing or processing plant. Mechanics or shop employees were used by some operators to keep trucks and other equipment in repair.

Other labor includes workers such as testers, watchmen, yard and scalehouse labor, and crew-truck drivers.

Payroll taxes and workmen's compensation insurance were added to the amounts paid workers to determine the total direct labor costs.

Gasoline, oil, and grease cost was the amount consumed by grove and crew trucks, loading machines, highway trucks, and in some cases by buyer's cars.

Repair covered all automotive equipment and loading machines, buildings, and in addition field box and ladder repair and replacement.

Licenses and taxes were principally the truck and auto licenses, but also included business bonds or licenses and taxes on any property used in the business.

Depreciation was the allowance to cover the estimated wear and tear on the physical assets used in the business. The total amount of depreciation was calculated by the firm's accountants in most cases.

Interest was the amount paid for the use of borrowed capital. No charge has been made for use of the owner's capital.

Salaries were paid to management, office employees, and fruit buyers where employed by the firm. Some of the citrus dealers were partnerships and individual proprietorships and had no paid management — this function being performed by the entrepreneurs. In these cases the owner was asked to estimate the value of his labor and management. If only the paid management costs had been included, the pre-box costs of management for dealers would have been less. However, this procedure would have left citrus dealers with no management expense, as compared with other firms where

(Continued on Page 34)

IF YOU LIKE SUCCESS-

Then you will like the best results that money can buy —

with your favorite fertilizer — and

FAIRFIELD AGRICULTURAL SLAG

The High Mineral Soil Supplement

from

Tennessee Coal & Iron Div. of US Steel

Ground in Florida

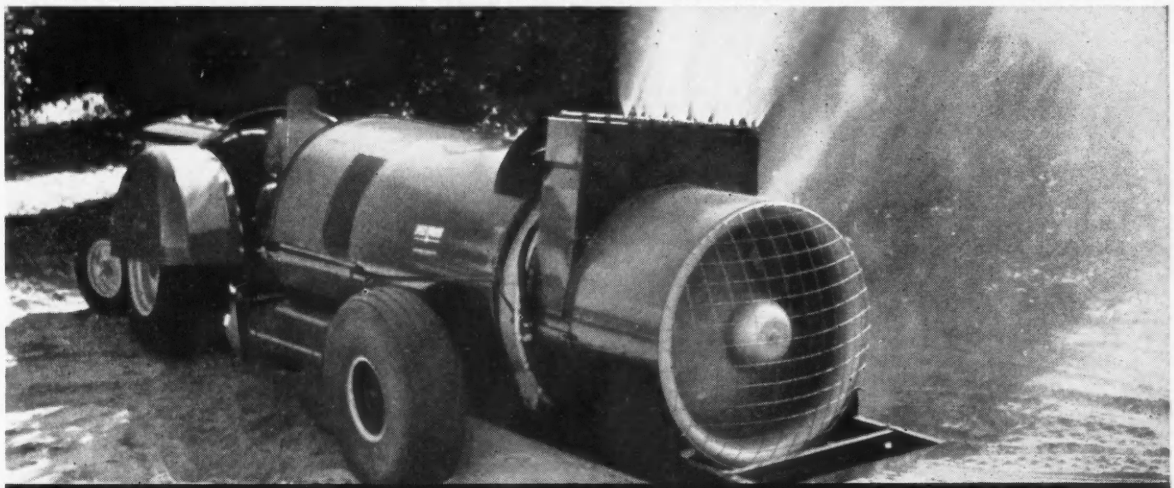
Contact Your Fertilizer Representative Or

FAIRFIELD OF FLORIDA AGRICULTURAL SLAG CORP.

PLANT
DAVENPORT

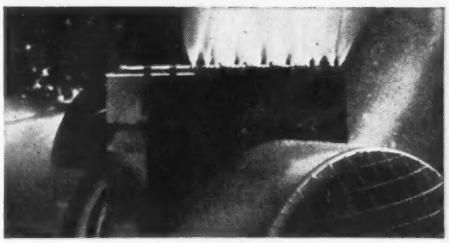
OFFICE
Ph. WINTER HAVEN Fr 2-1560

PENETRATE HEAVY FOLIAGE, COVER EVERY LEAF with the SPEED SPRAYER® OSCILLATING VOLUTE



FLORIDA BUILT FOR FLORIDA GROVES

Proven in Florida's thickest citrus foliage, the Speed Sprayer Oscillating Volute is specially designed to deliver protective spray through the heaviest shouldered trees. Air vanes in the volute oscillate the air stream to open up foliage — protective spray penetrates critical dense areas even in the topmost center branches. **New** Prestomatic Controls (optional) for spray delivery plus throttle control. See it demonstrated in your grove. Ask your dealer or call the Orlando plant.



NEW VOLUTE ATTACHMENT

Oscillates air stream to open up thickest foliage for positive, through-the-tree spray coverage. Available for either right or left discharge or double delivery.

CHOICE OF MODELS Ask Speed Sprayer to show you the model with the capacity that's best for your acreage and spraying schedules.

RUST-RESISTANT TANKS are protected by exclusive Metallizing process — no rust to clog nozzles, longer tank life assured.

DEMONSTRATION PROOF IN YOUR GROVE!

See for yourself how Speed Sprayer performance gives you best coverage . . . best protection for your trees. Ask us for a demonstration in your grove. Call or write Orlando plant for full details — also ask about our liberal trade-in and financing plans.

CONTACT

Speed Sprayer Plant, Orlando Fla.,

also southern sales headquarters for BOLENS outdoor power equipment

For latest data on SHUR-RANE ENGINEERED IRRIGATION write us at Orlando

John BEAN®

DIVISION OF FOOD MACHINERY AND CHEMICAL CORPORATION

LANSING, MICHIGAN • ORLANDO, FLORIDA • SAN JOSE, CALIFORNIA

fmc

CITRUS GROVE RECORDS

- - - BY - - -
ZACH SAVAGE
AGRICULTURAL ECONOMIST
FLORIDA AGRICULTURAL
EXPERIMENT STATION

When income from groves is high, growers do not worry about grove records, or production costs. When grove income drops to near or less than expenses, however, interest is revived in production costs, or anything else that might assist in keeping costs lower than returns. Such an undertaking is materially implemented by adequate grove records available over a period of several seasons—the more seasons, the better. Records are very helpful, also, in increasing efficiency in production and management during profitable seasons.

A financial record will indicate the results of over-all operations as to dollars and cents, but will not indicate the reasons why the profit or loss was what it turned out to be. It is necessary to know the financial status of the enterprise, but for future guidance it is more important to know the reasons why the enterprise made a profit or loss, as the case might be. A complete record might be considered a tool or piece of equipment, the use of which will assist in determining more efficient operations, better management, and more favorable financial results.

Variations in groves and grove practices eliminate the possibility of finding a single factor or a few factors and practices that are responsible for the good yields and profitableness of the best groves. The program and practices used on a profitable grove can seldom, if ever, be used in toto on another grove with equal success. Different groves under the same management usually receive different treatments. Groves must receive individual treatment for best results.

Successful growers consider the grove record a valuable piece of equipment and they keep it in use regardless of current fruit prices. It does not pay to keep a valuable piece of equipment idle. The more it is used, the higher the production efficiency.

The needs of a particular grove and its response to practices do not necessarily conform to that of any other grove. The individuality of groves necessitates individual treatment. Adequate grove records facilitate the individual treatment and management of each grove.

When studying results from fertilizers and grove management practices, the most satisfactory fiscal period for citrus grove records is September through August. When combining several seasons into an average, the fiscal period would not be very important, but when stpudying individual seasons, the fiscal period used is important. Results measured in fruit yields should be from the bloom that occurred in the spring of the fiscal period in question. For example: a grove record for September 1957 through August 1958 would produce fruit harvested in the period of September 1958 through August 1959 and would be chiefly the result of grove practices and treatment during the 1957-58 period.

Records should be kept each season on every grove and should include:

1. Inventory of equipment owned.
2. Grove chart and inventory of trees by age, variety, and rootstock.
3. Dates of all operations.
4. Costs by operations.
5. Tonnage and analysis of fertilizers applied.
6. Nutritional sprays applied.
7. Other spray and dust materials used.
8. Amount and date of irrigation water applied.
9. Rainfall record for the year.
10. Temperature record—particularly low temperatures.
11. Boxes harvested and financial returns by variety.
12. Number and variety of resets planted.
13. Complete grove chart of trees kept up to date.

Record Forms

The record for best suited to supply the information desired should be used. Large columnar sheets are often used to good advantage. Others use sheets of monthly data and make a summary at the end of the season. The number of groves involved should be considered in the determination of the forms used.

These forms are essentially the same as those used in a book used by the Agricultural Extension Service in cooperation with a limited number of growers in keeping detailed information valuable to the grower himself during current and future sea-

You need a BATH! YES, A WORLD-FAMOUS HOT SPRINGS THERMAL BATH

If you're healthy, you'll probably live longer because as it's said, "an ounce of prevention is worth a pound of cure." If you're nervous, tired, rundown or stiff from rheumatism and arthritis, you can find relief as thousands of others have. *You'll find the best at The Majestic* where you can go from your room to the bathhouse in robe and slippers. Here you will find specialists who know their business—experienced attendants and masseurs for the men and masseuses for the ladies—all licensed in accordance with the regulations under the Director of the Nat'l Park Service, U. S. Dep't of the Interior.

THE Majestic HOTEL & BATHS
HOT SPRINGS NATIONAL PARK ARKANSAS

ROOMS from—
$4.50 per day single
$6—double.
and you can budget
MEALS at $4.50 per day

Write the MAJESTIC today!

sons. This information over a period of years is of material help in finding more profitable methods of organization, operation, and management of the grove. Such information is also valuable in obtaining credit when needed. An additional use is to supply information for making income tax returns. These particular books also supply carbon copies to the Extension Service for making a summary of the particular grove and for groups of groves. These books are in the printed form and are supplied free of charge to cooperating growers, with the provision that the carbon copy of the record be sent to the Extension Service.

Grove Inventory indicates a form for recording a record of trees by variety, rootstock, age, planting distance, and the number of trees of each. This inventory is made at the beginning of each season. The first inventory made may necessitate making a count of each tree or can be made up from a grove chart of each tree in the grove. Each succeeding tree inventory may be readily made from the old one by adding one year to all ages, adjusting tree counts for trees removed, and adding nursery stock set.

Equipment Inventory is an inventory sheet for equipment used on the grove in the event such equipment is owned by the grove operator. If this equipment is used on more groves than those included in the particular account, the inventory may be summarized and prorated to the various grove records included on an acreage or use basis. Where the grove work is done by a caretaker, there is no equipment inventory to be recorded since these costs are included in caretaking charges.

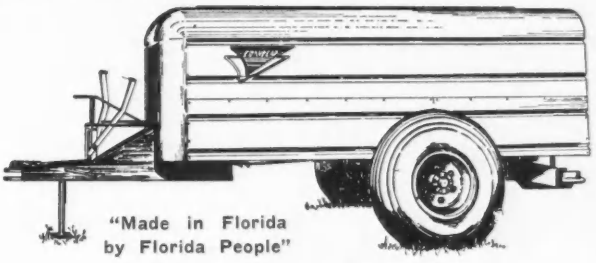
The first item on this inventory sheet is for an estimate of the value of the land and trees in the grove. This figure should be the amount the grove is considered to be worth for long-time fruit-producing purposes. The purpose of this figure is for determining interest on investment in land and trees. Consequently, this figure is important since interest on the investment should be considered in this and all other businesses.

Monthly Expenses. A large multiple column sheet could be used with a column for the date of grove operation. However, such a method does not provide for as much detailed information as the monthly sheet system.

This sheet is divided into four sections. The first section is for recording labor costs when equipment is owned by the operator. If caretaker or custom work is done this first section is for the entire operation except fertilizer and spray materials. In such cases, this section is used for labor, power, and equipment costs. Each operation is entered separately, specifying kind and cost under proper headings. Operations for which no column is provided are entered under "miscellaneous." The operations of plowing, disking, harrowing, and hoeing are placed in the cultivation column. The work of unpaid labor, both family and operator, should be charged at prevailing rates and entered under this section.

The second section is designated as "Other Expenses." This section is for recording materials used such as fertilizers, sprays, dusts, etc. Where equipment is owned by the operator, gasoline, oil, repairs, other materials, insurance, grove taxes and all other expenses except labor are recorded in this section. Purchases of equipment may be itemized and entered in the miscellaneous column if such is to be written off as current expenses. Equipment that is to be charged to

CONIBEAR "GROUND DRIVE" GROVE SPREADER



"Made in Florida by Florida People"

• One Man Operation
• Low Maintenance Costs
• 100% Belt Conveyor

OUTSTANDING FEATURES

OPERATION — By tractor driver with all controls conveniently located.
DRIVE — From a two speed truck axle to assure greater stability and greater weight distribution. 12:50 X 16, 10 ply nylon tires.
CAPACITY — Fertilizer approx. 3.5 cu. yds. or 4 tons; Lime approx. 5 tons.
DIMENSIONS — Low and narrow, height 65", width 64", inside body length 8'6".
TWIN DISTRIBUTOR FANS — Set low to insure an even under tree spread.
CONVEYOR — 4 ply nylon and cotton belt with stainless steel lacing which insures a steady even flow of material to fans.
CONSTRUCTION — Streamlined body design for greater strength made of 12 and 14 gauge steel mounted on 3/16" steel sills. Cover made of 3/4" oil treated steel reinforced plywood, built in two sections for easier loading.
OPTIONS — Swivel hitch, for use on beds or in rough hill country. Small tree attachment, with poundage range of 1/2 to 5 lbs. per tree; positive action to insure same poundage for every tree with skips of 5 or more trees possible without stopping conveyor. Tires, 17:50 X 16, 10 ply nylon tires for use on beds to give better coverage.
DEMONSTRATIONS — Call write or wire us.

TEST BOX and SCALES *for accurate poundage setting*

WIDTH OF SPREAD *30 feet, plus Adjustable — to suit pattern requirement*

POUNDAGE RANGE *From 50 lbs. per acre to 3 tons per acre*

CONIBEAR EQUIPMENT CO.

MANUFACTURED BY
CONIBEAR EQUIPMENT CO.
P. O. BOX 376 7 Miles North on U.S. 98
Lakeland, Florida
PHONE MU 6-5326 NITE MU 3-3923

more years of operation than the current one, should be entered on the equipment inventory sheet in the "additions and repairs" column.

The third section is for fertilizer analysis and tonnage schedule. This division is used only in those months when fertilizer is applied, which is usually two or three times each season. Attempts at a grove analysis from the standpoint of fertilizer added will not be of much value unless complete information is recorded. Therefore, it is highly important that the fertilizer tonnage and complete fertilizer analysis be recorded. Since approximately half of the operating or cash expenses annually on many of the most efficient groves are for fertilizers, there may be opportunity for improvement in more efficient use and management, resulting in increased yields and/or decreased costs per box.

The fourth section is for spray and dust analysis and schedule. Nutritional sprays applied add fertilizer value to the grove and care should be taken to record complete analysis and quantity of such spray in order that such may be included with fertilizers.

Monthly Totals Sheet is a summary sheet for the season and consists of totals assembled from the monthly sheets.

Grove Receipts. The grove receipts sheet was designed to show the on-tree receipts and boxes of fruit handled or picked by whatever method of sale used. The data desired is the number of boxes of fruit by variety and the amount of money the fruit brought on the tree.

Summary Statements

Summarized statements on costs and returns might include such items as:

1. Labor, power, and equipment.
2. Fertilizer materials.
3. Spray and dust materials.
4. State and county taxes.
5. Overhead, frost protection fuel, tree replacements, and other miscellaneous items.
6. Total operating or cash costs.
7. Interest on grove investment.
8. Total costs.
9. Returns.
10. Net returns.
11. Results by seasons on per-acre and per-box bases.

This is a summary statement for the grove for one year, and renders an easy comparison with other groves for that season, the same grove in other seasons, or other groves in other seasons. In making such comparisons, there are several things that should be taken into consideration. Probably the most important of these are the average age of trees and varieties of fruit in each grove.

A summary of fertilizer and nutritional spray might include:

1. Date, tonnage, and analysis of of each application.
2. The pH reading of the soil.
3. Soil analysis, if made.
4. Annual figures for all elements applied—per acre and per box.
5. Cost per acre and per box.
6. Seasonal figures over a period of years.

A summary of irrigation, if practiced, might include:

1. Inventory of irrigation equipment owned.
2. Interest on investment in equipment.
3. Application costs.
4. Amount of water applied with application dates.
5. Daily rainfall record for the year.
6. If irrigation is practiced, 10 or more trees that are about average as to size and productiveness should be left without irrigation at all times for a check. Yield of these trees should be recorded for comparison with the remainder of grove that is irrigated.

Tree Chart

Citrus is a long-time crop. Too much care cannot be exercised in the beginning to insure that the trees planted are worthy of the effort and expense. Work now under way towards nursery stock certification will materially assist in this realization. Likewise, every effort should be made to maintain each and every tree at top efficiency. To further assist in this effort, there is no one thing the grower can do that will be more valuable than a tree chart of the grove. Such a chart will assist in checking questionable individual trees to determine whether their production is profitable or whether they should be replaced by the best nursery stock obtainable.

Concluding Statement

Keeping and using records after they are kept contribute much to the efficiency of any citrus enterprise. It is important to regularly maintain data on grove conditions and production costs. Grove practices and elements of management become more meaningful when responses are available on paper for study and comparison.

KEEP INFORMED

On Matters
Pertaining To Citrus Production
By Reading
THE CITRUS INDUSTRY
Every Month

Tear Out and Mail Coupon Below

The Citrus Industry,
Bartow, Florida

Please send me The Citrus Industry for 1 ( ), 2 ( ), or 3 ( ) years.

Name _____

Address _____

_____

SUBSCRIPTION RATES:

1 Year $1.00 — 3 years $2.50 — 5 years $4.00

Buyer's-eye view of S-P-M citrus quality
Peel and section a Sul-Po-Mag grown orange. You can see, test and taste the improved quality Sul-Po-Mag adds to your grove's "diet."

better color...thinner rind...more vitamins in the juice

That's what buyers see in samples picked from trees nourished by Sul-Po-Mag. Citrus trees "like" what they get from Sul-Po-Mag — water-soluble magnesium that produces fruit of exceptionally good quality. Tests prove that, with adequate magnesium, rinds *are* thinner... color is brighter (inside and out)... and sugar and vitamin content of the juice are greatly increased. With Sul-Po-Mag, yields are greater too. Water-soluble Sul-Po-Mag stays in grove soils all season long... slowly releases magnesium nutrition for better tree health and higher fruit quality. Next time you buy fertilizer, ask for Sul-Po-Mag.

S·P·M PREMIUM
Quality fertilizer containing a combination of readily available magnesium and sulphate of potash obtained from Sul·Po·Mag®

This seal is your assurance of extra-value fertilizer

AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

ADMINISTRATIVE CENTER: SKOKIE, ILLINOIS

IMC
PRODUCTS FOR GROWTH®
®TRADEMARK

SPM-24-01

ADVERTISEMENT — LYONS FERTILIZER COMPANY

The LYONIZER

COMPILED BY THE LYONS FERTILIZER COMPANY

Reports Of Our Field Men . . .

WEST HILLSBOROUGH, PASCO AND PINELLAS COUNTIES

Calvin P. Lloyd, III
Tampa, Fla.

Most of the early fruit has already moved to market and the pickers are fast at getting the mid-season fruit. There is already much activity in the boxing and selling of Valencias, with some transactions already made.

In this area the insect pests are not in any great numbers in most of the groves. There are a few red spider eggs scattered around and also some rust mites are seen, but in most instances they have not reached a damaging infestation. If a dormant nutritional spray is to be applied, this is an excellent time for this to be done.

There are quite a number of young trees being set in this area. The growers are wisely allowing proper drainage to allow for the excess water that we have had in the past few years.

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

R. C. Revels, Jr.
P. O. Box 3332, Apollo Beach, Fla.

Most of the citrus growers are getting ready to apply a top dressing on the bearing groves now. This is especially recommended to help bring on a good bloom. Most of the groves are in good condition with little or no damage from the cold weather.

Red spiders have been very busy so far this fall and most groves have an infestation of mites at this time. Growers have been spraying with Trithion and Zineb for the mite control. There are some aphids showing up in the young trees and a close watch should be kept to ward off damage as was experienced last year. If the young growth comes on out and does not linger along as it did last year, we shouldn't have to worry too much about the aphids.

When the weather breaks and the cold danger is over, a good schedule should be set up for fertilizing young trees. Every four to six weeks seems to be the best all around way to rush young trees during the growing period. Most growers in warm section will start to fertilize young trees around the middle of February. If in a colder section, starting will be later.

For advice on fertilizing, call your Lyons Representative.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We have had a very good average so far with the weather 1961.

Fruit has been moving fast, and you can see groves now waiting for spring time. The rain we had Friday (13) was very good to start them feeding. We got by lucky with the cold. No fruit damage, just a little foliage burn in some young groves.

HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr. & J. E. Rubush
P. O. Box 1304
Winter Haven, Fla.

Moderate rainfall in this area has helped in easing the effects of the dry fall we experienced. Irrigation of the groves is still continuing in some areas.

Growers will soon be concerning themselves with the Spring fertilizer application. This application should be well on its way by the first of February.

Due to the excessive foliage loss from the storm we are noticing manganese and some zinc deficiency patterns on the citrus foliage. It would be well for growers to be on the lookout in their blocks for these patterns and plan on applying these materials in their nutritional sprays this spring if they are needed. We have also noticed some iron deficiency patterns which may be corrected by the addition of iron chelate to the spring or summer fertilizer.

It is expected that the Six-spotted Mite infestations will be light through January and then build up rapidly in February. Growers should be on the lookout for these mites.

After a heavy infestation of Rust Mite for the past few months we are beginning to notice some decrease in the population.

HILLSBOROUGH, PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

We find the fruit trucks steadily increasing on the highways, hauling the citrus to the various processing plants. Most citrus growers are experiencing another good year with the sale and returns very enjoyable. However, most growers that I have spoken to about their fruit did not get the amount of boxes from their groves as they, the growers, thought they had. This could mean, that with the various groves not picking out as expected, that the number of boxes throughout the state could be somewhat lower than the present estimate. Some growers feel that we will have another prosperous year again next year.

Strawberries are looking good with a few berries being picked. It looks as if the growers will begin picking much heavier in a week or ten days. Prices are good at present.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glendale 3-4537
Avon Park, Fla.

With the fall fertilizer program completed and the good weather, it is making us think toward the top dresser application. With storm damage that reduced greatly the foliage we are badly in need of all new growth possible. Consideration should be given to this application and also protect the new growth with proper spray program. The high water has begun to take its toll. In low areas the tree has lost foliage and wood. With the root system gone the plant food should be put close under limbs.

Fruit movements have picked up but still behind normal. At this time Pineapple oranges are either picked or sold. All indications are that tonnage will be much lighter than first estimated. This has brought about an increase in prices. Tangerines have been slow most of the season and there are still a lot of them on the trees.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Uncle Bill Says:

They is one thing which the citrus and vegetable growers of Florida has demonstrated many times over in years past 'n that is that they kin take most any adversity in their stride.

Over the years hurricanes, freezes, drouths, pest infestations and adverse markets all has tried the souls of Florida growers but through them all Florida growers has come through in good shape, 'n for the most part are in as good er better shape than growers anywhere.

As a class we believe that Florida growers study the remedies for their problems more thoroughly than most any other class of business men . . . which undoubtedly has a lot to do with Florida's good record.

They was a time when Florida growers jist wouldn't work together in solving problems which affected their industry, but within the past several years a marked change has taken place, and the effects of growers cooperation has been evident in the season's balance sheets.

Hard work is a definite part of any job of raisin' fruit er vegetables, but in addition the increasin' knowledge of growers about how to handle their many problems, 'n the help which the Citrus Experiment Station, the U. S. D. A., the Florida State Horticultural Society and the constantly increasing crop of trained horticulturists is giving to the individuals of the industry helps to assure profitable crops aganst any hazards even includin' weather.

Another thing that a lot of Florida growers has learned is that Lyons Fertilizers Produce Maximum Crops of Finest Quality.

COST OF PICKING AND HAULING FLORIDA FRUITS, 1958-59 SEASON

(Continued from Page 26)

management was fully paid. All management salaries shown for packinghouses were actually paid, though some of such firms did not allocate any of their management or office salaries to picking and hauling operations.

Brokerage or commission was sometimes paid on the sale of, or procurement of fruit by other buyers.

Supplies and shop expense included picker's tickets and various supplies, and shop tools and materials not easily classified with some other expense.

Office supplies and expense included stationery and other materials for office use.

Telephone and telepgraph was used principally in buying and selling of fruit, but a portion was allocated to picking and hauling also.

Lights, water, and power expense included the office consumption and sometimes power for graders or fruit elevators, and shop.

A few firms rented equipment of various kinds for a part of their operations.

Travel and auto expense was incurred mainly in the buying and selling of fruit, but also some in supervising the picking crews and fruit hauling. Some firms paid a mileage rate for autos used, while some owned the cars and supplied fuel, repairs, etc.

Miscellaneous expense included a great many items, some of which were sizeable sums for a few firms but averaged small amounts. This group is made up of advertising, public relations expense, dues, subscriptions, donations, driver's expense accounts, business bad debts, legal and auditing, radio expense, and many unclassified items of expense.

SPRAY PROGRAM AIDS CITRUS PEST CONTROL

Florida citrus growers are reminded that best results are obtained when correct pesticides are used in recommended amounts at the proper time.

Jack T. McCown, assistant citriculturist with the Florida Agricultural Extension Service, says thorough spray coverage of foliage is necessary to obtain the most economical insect control.

Growers planning to apply pesticide sprays are urged to secure a copy of the 1961 Better Fruit Program Spray and Dust Schedule for Citrus.

Published by the Florida Citrus Commission, the publication is available from your county agent's office. McCown says it is the best guide for determining the correct sprays and spray formulations.

For further information concerning the 1961 citrus spray program, consult your local county agent or the Florida Agricultural Extension Service, University of Florida, Gainesville.

Classified Ads

NURSERY STAKES — Galvanized Steel. New 3/16" x 30" (Standard). $35.00 per 1,000 while they last. Cauthen Grove Service and Farm Supply, Leesburg, Florida, Phone ST 7-3516.

TO BUY OR SELL
CITRUS GROVES — write
JOHN J. BRENNAN
P. O. Box 1537 Lakeland, Florida

QUALITY CITRUS TREES For Sale. Ready for planting now. Hamlin, Valencia, Enterprise Seedless, Navels, Parson Brown ½" to ¾". All on Sour Orange Root Stock. Certified Free of Burrowing Nematode. OSCAR F. GREENLUND, Box 218, Pierson, Florida. Phone 3921.

BASSWOOD LADDERS
Fruit picking ladders, light, durable.
Sizes 18 ft. to 36 ft. in stock.
Write for prices.
A. M. PREVATT
PHONE 749-2115 SEVILLE, FLA.

AVAILABLE FOR IMMEDIATE DELIVERY: REGISTERED HAMLINS ON CLEO, a limited quantity of non-registered Hamlins on sour and Pineapples on lemon. All other common varieties, REGISTERED psorosis and xyloporosis free, or non-registered, on lemon, sweet, Cleo, or sour rootstock available for Fall of 1960 and Spring of 1961. Fancy varieties, both REGISTERED and non-registered also available. Write for prices. GRAND ISLAND NURSERIES, P. O. Box 906, Eustis, Florida.

ADAMS CITRUS NURSERY
Popular Varieties on Rough Lemon, Sour Orange Rootstocks. Large Sizes For Resets.
Grown on Virgin Land
ORDER NOW FOR FALL 60 SPRING 61
Winter Haven
Off: CY 3-5672 — CY 3-6075
Haines City
Nursery — HA 2-4055

SPECIAL!
SCARCE REGISTERED PSOROSIS-FREE STOCK

15,000 Pineapple on rough lemon

12,000 Valencia on rough lemon

Up to 1¼" caliper, $2.00 each. Orders of 500 or more delivered free. Inspection invited. Call for appointment, GLendale 3-4657 day or GLendale 3-4433, night.

WARD'S NURSERY, INC.

BOX 846 AVON PARK, FLA.

ATTENTION! — Citrus Growers. Don't burn up those seedling trees. We buy seedling orangewood. Highest prices paid. Call or write — FLORIDA ORANGEWOOD CORP., 1527 LaSalle Street, Tampa, Florida. Phone 88-9421.

GROVE PROBLEMS?

Consult Dr. Wolf to bring back and keep your grove in top condition. Phone or write for free details.

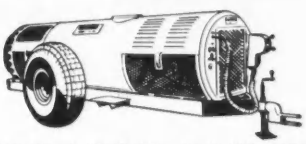
DR. WOLF'S LABS
2620 Taylor St.
HOLLYWOOD, FLORIDA
Phone: WA 2-2808

Hamlin, valencia, pineapple and temple oranges; orlando and mineola tangelos for spring or summer planting. Nemotode free. Prices on request. Crescent Farms, P. O. Box 890, Bradenton, Florida. Telephone 2-3821 or 2-7004.

GENUINE PARTS
GUARANTEED SERVICE
POUNDS TRACTOR CO.
Your Case and Hardie Dealer
Two Locations:
3rd & Ave. "D" — S. W. WINTER HAVEN
102 North Rest Ave. AVON PARK

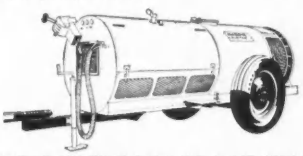
READY FOR A SPRAYER?
SELECT A HARDIE

HIGHEST PERFORMANCE LEVEL OF ANY SPRAYER IN THE WORLD...



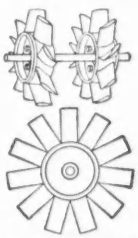
HARDIE DF-520 "DUO-FAN" AIR BLAST SPRAYER

Perfect for the medium size grower, delivering over 62,500 cubic feet of air per minute.



HARDIE DF-480 "DUO-FAN" AIR BLAST SPRAYER

Perfect for the smaller grower, delivering over 40,000 cubic feet of air per minute.



"DUO-FANS" EQUAL ONE BIG FAN

Hardie exclusive patented "Duo-Fan" assembly is standard equipment on all sprayers. Delivers 30% more air volume than conventional axial flow fans.

AIRCRAFT TYPE REMOTE CONTROLS

Dependable . . . Proven . . . Hardie aircraft-type remote controls are simple, rugged, controls throttle and spray delivery on one or both sides.

That's just what you get . . . no matter which of the many models you choose. Measured by any standard, judged by any detail, the HARDIE Duo-Fan, two fan sprayers are the greatest and most advanced sprayers ever built.

Not only are these sprayers bigger than ever before, but each and every part right down to the nozzle tips saves time and labor, and cuts maintenance costs to the vanishing point. HARDIE sprayers simply are bigger and stronger than any other sprayer on the market.

Just look at the many exclusives: HARDIE sprayers permit you to adjust nozzles, even change tips easily and quickly in the field. Spray the largest trees on BOTH sides of the row, and meet the most gruelling tests with more than ample capacity and power. HARDIE sprayers give you adjustable air guide vanes to meet your most exacting requirements. HARDIE gives you two large aluminum axial flow fans which provide more working area than any other sprayer in its class. HARDIE gives you stainless steel tanks, stainless agitator shafts, stainless agitator paddles, stainless drive tubes, all stainless interior piping. HARDIE gives you dependable proven aircraft-type remote controls. Heavy duty construction, simple design, easy to operate. Controls throttle and spray delivery on one or both sides. HARDIE HAS JUST THE SPRAYER FOR YOU . . . The DF-480 delivering over 40,000 cubic feet of air per minute, and made for the smaller grower . . . The DF-520 delivering over 62,500 cubic feet of air per minute, and made for the medium size grower . . . The DF-800 delivering over 97,500 cubic feet of air per minute and made for the larger grower.

There are many more exclusives in the more than 17 Duo-Fan Models you can choose. See your HARDIE Dealer soon, or fill in and mail the coupon below today.

HARDIE
AGRICULTURAL SPRAYING EQUIPMENT
• SOLD AND SERVICED
ALL OVER THE WORLD

AGRICULTURAL SPRAYERS
•
HIGH PRESSURE PUMPS
•
DUSTERS

THE HARDIE MANUFACTURING CO., INC., DEPT. CI
WILKES-BARRE, PENNSYLVANIA

☐ *Have a Hardie salesman call on me.*
Details on ☐ *DF-800* ☐ *DF-520* ☐ *DF-480*
☐ *Info., on Dealer territories available*

NAME_____
ADDRESS_____
CITY_____ STATE_____

SERVING THE FRUIT GROWERS FOR MORE THAN 66 YEARS

Quality Crops Are Largely Dependent . . .

. . . upon the quality of the plant food your crops receive in their fertilizer treatment.

More than a third of a century of study and analysis of Florida citrus and vegetables is reflected in every pound of Lyons Fertilizers which goes out to our customers.

LYONS FERTILIZERS Produce MAXIMUM CROPS Of FINEST QUALITY

Our Field Service Men also are fitted to aid our customers with effective counsel.

Lyons Fertilizer Company

Phone 43-101

Tampa - Florida